I. L. ANDREYEV

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PROGRESS PUBLISHERS

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И. Л. Андреев

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Engels's Plan and the History of His Article

The materialist theory of the historical process, created by Marx and Engels, can be applied in explaining the present, in predicting the future, and in analysing the distant past—the law-governed process which led to the appearance of man and society.

Frederick Engels's article "The Part Played by Labour in the Transition from Ape to Man," written in mid-June of 1876, occupies a special place in the literature on the origins of society. Even today it remains a striking example of scholarly insight and journalistic vividness.

Engels originally conceived the article as an introduction to a larger work, which he intended to call *The Three Basic Forms of Slavery*. Later he changed this title to *The Enslavement of the Worker: Introduction.* It is for this reason that so many topics are touched on in this brief article: the laws governing the biological and social emergence of mankind, the interaction of society and nature, the possible social consequences of productive activity, the development of private property, the transitory nature of capitalism, and numerous others. The intention of writing a work on the forms of enslavement remained unrealised, and Engels eventually included the introductory article in his *Dialectics of Nature*, giving it the title by which it is known today.

The article generalises from what had been achieved by the natural and social sciences of the time. Engels

had a deep and lasting interest in the natural sciences, which was powerfully stimulated by the appearance of Charles Darwin's *Origin of Species* towards the end of 1859. Engels read Darwin's work shortly after its publication. In a letter to Engels dated December 19, 1860, Marx wrote: "This is the book which, in the field of natural history, provides the basis for our views."[1] Engels believed that Darwin's theory of evolution would become central to the struggle between progress and reaction. The socialists, he wrote in 1878, had foreseen that proponents of Darwinism would necessarily adopt a certain position regarding the socialist world view.[2] A new monograph by Darwin, *The Descent of Man and Selection in Relation to Sex*, appeared in London in 1871. Despite its thoroughly academic title, it immediately became the object of general attention among the reading public. It was angrily condemned and spitefully mocked in society salons and the sensational press, anathematised from pulpits, and enthusiastically embraced by the foremost minds of the day. Rarely has a specialised work evoked such a powerful and prolonged reaction in society as a whole.

What was it about Darwin's publications that so disturbed clergymen, scholars, and ordinary citizens? First of all, obviously, that they presented rigorous scientific proof of mankind's natural (rather than divine) origin. Darwin's new book not only showed that the human species was genetically tied to the higher mammals; it backed this thesis with solid arguments. Darwin's discovery of the animal origin of mankind naturally had an explosive effect on the scientific, philosophical, and everyday thinking of the latter half of the nineteenth century. Questions such as where the border lay between the animal and social worlds, the nature of their connection, and the possibility of finding transitional forms took on a new edge.

[1] Karl Marx and Frederick Engels, *Collected Works*, Moscow, Progress Publishers, Vol. 41, p. 232.
[2] Marx, Engels, *Werke*, Bd. 36, Berlin, Dietz Verlag, 1966, S. 334.

But the idealistic and metaphysical concepts of the essence of life then current prevented contemporary science from finding the methodological basis needed to analyse such complex and often unaccustomed problems objectively. Even scholars with advanced views, selflessly dedicated to uncovering the laws of nature, fell into fundamental errors. Some absolutised the direct and concrete influence of the environment on the organism; they held that the evolution of the animal world was immediately conditioned by changes in external conditions. Others, on the contrary, exaggerated the importance of instinctive reflexes in the higher animals, their autonomy and evolutionary independence of the environment. In reality, both extremes supposed the existence of some non-material, supernatural force, the source of a "higher purposiveness".

Darwin showed that mutability, heredity, and natural selection accounted for evolution in the animal world. It was not only the strongest species, populations, and individuals that survived and left descendants, not only those best adapted to one set of natural conditions or another, but also those that were most amenable to further biological evolution. In essence, Darwin's conception made natural selection the dialectically active intermediary between the organism and its environment, the methodological basis for explaining the connection between an organism's morphology and functioning, between environmental change and adaptation.

Despite certain historical limitations of his views, which were due to the condition of contemporary science, Darwin awakened unabating interest in the question of man's emergence from the animal world and provided a mighty impulse towards examining this problem from a fundamentally new philosophical position. His teachings marked a revolution in thinking about human origins.

Marx and Engels fully appreciated Darwin's great discovery, which scientifically proved mankind had emerged from the animal kingdom. In Engels's book *Ludwig Feuerbach and the End of Classical German Philosophy* Darwin's theory is numbered among the principal factors within the natural sciences that contributed to the rise of dialectical materialism. In his Preface to the 1888 English edition of the *Manifesto of the Communist Party*, Engels stressed that Darwin's theory has done for biology what Marx's discovery of the objective laws governing social and economic development was destined to do for history.

Engels gave special attention to Darwin's theory of evolution in his article "The Part Played by Labour in the Transition from Ape to Man". He addressed himself to this issue at a time when discoveries in biology had given rise to an ideological struggle between materialists and idealists, between dialecticians and metaphysicians. Taken together, all this makes understandable why Engels included reflections on the origins of man and of society in his great work *Dialectics of Nature*.

"The Part Played by Labour in the Transition from Ape to Man" remained unpublished in Engels's lifetime. It first appeared in 1896, in *Die Neue Zeit*, the theoretical journal of the German Social Democrats. It was next published (as part of *Dialectics of Nature*) in the USSR in 1925, with a parallel Russian translation. Since then it has been republished several times as part of the latter work.

Résumé of Engels's Article

Engels begins his article with the thesis that labour is not just the source of all wealth, as classical bourgeois political economy affirmed. "It really is the source—next to nature, which supplies it with the material that it converts into wealth," Engels wrote. "But it is even infinitely more than this. It is the prime basic condition for

all human existence, and this to such an extent that, in a sense, we have to say that labour created man himself."[1]

Engels goes on to present arguments for a conception of the biological and historical origin of man and society known to modern scholarship as the labour theory of anthroposociogenesis. Taking the fundamental principles of the dialectical-materialist view of history as his starting point and relying on the scientific discoveries of his day, he follows Darwin in reconstructing a hypothetical race of very highly developed hominid apes inhabiting equatorial and subtropical regions somewhere in the vicinity of the Indian Ocean. The insuperable laws of biological evolution placed this race before a dilemma: to die off or to adapt to changing conditions. Its continued existence was tied to a break with the animal world.

Engels does not discuss the causes for the crisis in the earlier way of life of these apes; at that time science did not know about genetics, radiation and the effects it has on living organisms and heredity, breaks in the Earth's crust in East Africa, the repeated shifts in the Earth's magnetic poles, etc. He emphasises that the evolution of our simian ancestors was brought about by natural conditions; there is no need to invoke Divine or other external forces. The primary biological factor, in Engels's view, was the change to an upright posture, which freed the forelimbs—the arms—from use in locomotion and made it possible to employ them in providing for vital needs. The hands also became the first tools of labour (after the teeth). An upright gait became habitual for these apes, and they engaged in more and more intensive manipulation of objects—including inedible objects—in their environment. There was a strengthening of the group instinct, and individuals within

[1] Frederick Engels, *Dialectics of Nature*, Moscow, Progress Publishers, 1979, p. 170.

the group carried out coordinated actions. All this provided an impulse for further development of the brain and of its product, speech. As Engels notes, speech is biologically connected with the evolution of the larynx and the whole vocal apparatus of our zoological ancestors, but goes far beyond parrot-like mimicry of sounds. It is conditioned by individuals' need to communicate with one another.

This is one of the main points of difference between Engels's position and that of Darwin and especially the naturalists of his school. Engels does not limit himself to biological factors in accounting for man's appearance on earth; he also makes a profound analysis of the social aspects of this process.

Engels gives special prominence to the emergence of man from simian ancestors who were—most importantly!—social animals. They lived and searched for food in groups. They joined together to defend themselves against enemies and to hunt. We must suppose that in critical situations they came to one another's aid and protected their females and young. In a word, the zoological instincts they had in common with all other animals had been supplemented, through natural selection, by the development of mutual toleration and an ability to make joint action and group behaviour a feature of their way of life. This distinctive trait took on cardinal importance in the evolution of our simian ancestors into qualitatively different, though genetically similar, transitional creatures who went on, under favourable conditions, to acquire more and more human characteristics. Engels notes that the transition from ape to man under the influence of emerging labour processes took place over an extended period. His analysis of the motive forces behind anthroposociogenesis and of its stages applies the fundamental laws of materialist dialectics: the unity and antagonism of opposites, the transition of quantitative change into qualitative and vice versa, and the negation of the negation.

Engels further stresses the dialectical unity of the processes through which man and society arose. He regards society as something more than a simple aggregate of "ready-made" individuals who enter into a sort of gentlemen's agreement (as Rousseau would have it) to respect one another's interests. Society, in Marxist theory, is an aggregate of social relations. As Engels perceived, the centre, the "chrysalis", from which these relations unfold is labour. It is labour that ultimately distinguishes human society from a troop of apes. And the beginnings of labour, as Engels believed and modern science bears out, lies in tool making.

Engels writes that the first tools were at the same time weapons, which prompted the development of hunting and fishing. This in turn made it possible for the emerging human race not only to distance itself still further from the vegetable kingdom, but also to rise above the animals. The change to a carnivorous diet providing more calories promoted the development of the brain, and also led to the use of fire and the domestication of animals.

"Mastery over nature began with the development of the hand, with labour, and widened man's horizon at every new advance,"[1] Engels states. Mankind's settlement of all regions of the earth and the accelerating development of productive forces were also based on the refinement and diversification of labour. Agriculture appeared, together with spinning and weaving, pottery, navigation, trade, the various crafts, arts, and sciences. "Law and politics arose, and with them that fantastic reflection of human things in the human mind—religion."[2]

Engels then proceeds to analyse the fundamental difference in the ways man and the animals interact with

1 Engels, *Dialectics of Nature*, p. 173.
2 Ibid., p. 177.

nature. The animals, by natural selection, are impelled by the biological rhythms of nature, while man has to some extent freed himself from the harsh grip of the elements. But this freedom, as Engels teaches, does not at all mean that man is removed from the course of natural processes. He begins to perceive and to study the laws governing those processes and to engage in purposeful activity. Engels argues that the purposiveness that characterises human activity is by no means an abstract product of the brain's functioning, of consciousness. It is conditioned, in the last analysis, by relations among people in the process of producing material goods. As long as these relations remain antagonistic and are directed to immediate goals (bringing in a harvest, a profit, etc. today, tomorrow, or in a year or two), there is a potential ecological danger for the remote future of human activities. When natural cycles that have taken shape over millions of years are upset, irreparable ecological damage can sometimes result. Engels cites many instances of this in antagonistic socio-economic formations.

In the concluding fragment of the article Engels points out the historical limitations of classical political economy, the social science of the bourgeoisie, which "in the main examines only social effects of human actions in the fields of production and exchange that are actually intended".[1] Recalling the world economic crisis of 1873, the effects of which were felt in Germany, he demonstrates the myopia of bourgeois political economy with regard to the remote social consequences of capitalist management of the economy. Thus "private ownership based on one's own labour must of necessity develop into the expropriation of the workers, while all wealth becomes more and more concentrated in the hands of non-workers; that...".[2]

[1] Ibid., pp. 182-83.
[2] Ibid., p. 183.

At this point the manuscript breaks off.

Such, in brief, is the logical design of Engels's work "The Part Played by Labour in the Transition from Ape to Man". The methodological and theoretical problems it raises will be examined in what follows from the standpoint of their influence on the world view of the time. Some of them will be confronted with the discoveries of modern science.

Such an approach to the study of Engels's work is clearly superior to furnishing a mere commentary; it throws into high relief the creative and heuristic power of the dialectical-materialist view of history. The methodological significance of this work, written more than a century ago on the basis of comparatively limited data, has not been exhausted; rather, it has grown. The fundamental gnosiological principles formulated by Marx's great comrade-in-arms in his study of anthroposociogenesis are a trusty compass for modern scholars in the stormy ocean of recent scientific discoveries in this field of knowledge and others related to it.

Engels's Work as the Foundation of the Theory of Anthroposociogenesis

Engels did more than summarise the facts he knew from sciences in his day; he created a conceptual scheme of the dialectically interconnected tendencies, stages, and components of human and social evolution. The Marxist theory of anthroposociogenesis encompassed the raw scientific data and tied them into a logical whole, thereby revealing the objective laws governing the emergence of man and society. It is continually being augmented with new discoveries, facts, and conceptions.

Engels's article "The Part Played by Labour in the Transition from Ape to Man" is a striking example of far-ranging research; the understanding of anthroposociogenesis it presents is encyclopedic in scope. It should

be specially noted that the Marxist concept of anthroposociogenesis, in its methodological and atheistic aspects, even now continues to be of enormous significance. In it, for the first time in the history of the social sciences, the method of dialectical materialism was creatively applied to the analysis of one of history's greatest mysteries. In doing so it harmoniously combined the approach of the natural sciences with that of philosophy in unravelling the central problem of the beginning of human history, which forms a link connecting dialectical and historical materialism.

Today, as in the time of Darwin and Engels, bourgeois ideologues advance speculations about the permanence of conflicts and vices in society. They distort the truth not only of the present stage in history, but also of its beginnings. They seek to depict the social antagonisms objectively inherent in capitalist society as features of the psychology of the individual, "holdovers" from the animal world that have been with the human race since the beginning and will continue to exist forever. Their purpose is to obscure the social causes of these antagonisms and their historically transient character. To accomplish this, bourgeois ideologues have even gone so far as to claim that the rise of man—whom they regard not as a social being, but as an isolated individual—is not yet complete. In the 1920s, Sigmund Freud pictured man as an animal fettered by culture. In our own times, the Austrian biologist Konrad Lorenz considered that modern man is nothing more than a stage in the transition from the animals to humanity proper. The noted English biologist Cyril Darlington has argued that not only people's social conduct but even their class membership is genetically determined. The opposite extreme is seen in the artificial socialisation of relations in the animal world, the attempt to find in it classes, property, and aggression. Much effective writing along these lines has been done in the last few decades by the American author and

biologist Robert Ardrey.

These pseudoscientific fabrications either superimpose the social relations of bourgeois society on phenomena in the animal world or interpret biological laws manifested there as central to social relations, as the motive forces in social development. Absolutisation in either of these directions inevitably distorts the social nature of mankind and the biological essence of the animal world.

It is appropriate to mention here that Marx and Engels engaged in polemics against essentially similar biologising and sociologising views. The dialectical-materialistic conception of the rise of man and society that they elaborated exploded the myth of solitary savages who "agreed" to organise themselves into a society, and also the vulgar natural-philosophical idea that man had been inspired to form societies by examples in the animal world.

The Marxist theory of anthroposociogenesis reveals man's origin and development, the relation between the biological and the social in his life and activities, the social character of labour, and the role of the latter in the rise and progressive development of mankind. It is possible, from this standpoint, to define trends in the relations between society and nature and trace prospects for the future. All of these questions continue to be of current interest in ideology as well as science. They are concerned, quite naturally, with the basic material interests, social positions, and historical prospects of various social classes.

Evolution and Labour

Let us consider the relation between natural selection and labour in Engels's article and in modern conceptions of anthroposociogenesis. In "The Part Played by Labour in the Transition from Ape to Man", Engels exam-

ines the hypothesis of Darwin, who in accounting for the rise of man gave preeminence to sexual selection. It should first of all be noted that labour, in the concrete historical form it took in the bourgeois society of Darwin's time and as he himself perceived it, created the impression of subjugating, insulting, and humiliating the labourer. Fierce competition and the struggle for survival overshadowed the impulses to cooperation and mutual assistance and the creative, constructive attitude to the surrounding world that are inherent in labour. For these reasons Darwin, having worked out the biological aspect of man's origin, stopped at the threshold of the related social questions, which could not be resolved in terms of natural selection. He was puzzled, for example, by the plain everyday fact that the brave and altruistic—that is, people endowed with qualities valuable to society—have far less of a chance of leaving numerous descendants than egotists who do not take risks for the sake of others. Moreover, in the heat of the polemics over man's biological kinship and close genetic links with the animals, he unwittingly neglected the profound qualitative distinction that sets man apart.

The dialectical-materialist view of history enabled the founders of Marxism to discover the dual nature of labour: in all of its varied concrete forms, it also appears as abstract labour, that is, as the expenditure of energy by the muscles, nerves, and so on—as labour in general. This category is applied not only in analysing the developed types of social production, past and future, but also in explaining the rise of man and society.

Labour, as a social phenomenon, cannot in principle be identified with the purely biological functions of man, since it includes actions contrary to animal instincts. At the same time, it originated as a means for survival, that is as an essentially biological impulse, aided by its outward similarity to certain purposeful actions in animals. Nonetheless, human

labour and the actions of animals are radically different.

Labour did not supersede the functioning in the human organism of mutability and heredity, the purely biological mechanisms characteristic of animals. However, it profoundly altered the direction in which natural selection acted. The primary criterion of selection became an ability to use artificial tools and to cooperate with others of the same species. Closely knit groups—human collectives—made their appearance. Natural selection began to lose the universal significance as a factor in progress that it had earlier held in nature. It had become self-eliminating.

The conception of self-eliminating natural selection was worked out by Soviet scholars. It rejects the narrow, vulgar-biological interpretation of the role of labour in anthroposociogenesis, while pointing to the true character of natural selection and the methodological significance of Darwinism this implies.

Thus Darwin's conception of natural selection and Engels's theory of labour do not exclude one another, but rather are complementary.

It is to Engels that the honour of having worked out the social aspect of anthroposociogenesis belongs. His achievement, moreover, dates from a time when specialised fields such as archaeology and paleontology were still in their infancy.

The remains of Neanderthals had been found in 1848 and 1856, but science had not yet correctly interpreted these discoveries or realised what they meant. The chief tool used by Engels in his study was the dialectical-materialist philosophy jointly elaborated by Marx and himself. It may be noted that the early works and manuscripts of the founders of Marxism, and also Marx's *Capital*, had necessarily touched on the origins of labour, consciousness, and language in examining the life of society. And of course an inquiry that adopted a fundamentally new methodology in dealing with the social aspects of man's origins could not ignore existing

conceptions of the biological side of the same phenomenon, including the most advanced views of the time.

In "The Part Played by Labour in the Transition from Ape to Man", Engels used the scholarly achievements of Marx and Darwin to prove that the rise of man and of society are inseparable, dialectically interacting aspects of a single process. But Engels's contribution to the understanding of human origins was not limited to the theory of sociogenesis. He also shed new light on many questions involving anthropogenesis (the conception of the evolutionary formation of the human physical type) and showed that it is objectively connected with sociogenesis in the integral process through which society develops. In particular, Engels overcame the social limitations of Darwinism. The great creative potential of the evolutionary theory was threatened by idealistic accretions; Engels purified and defended it. The Marxist theory of the rise of man and society through labour took over the achievements of Darwinism in a form that had been purged of biologising tendencies. It was these tendencies, incidentally, that together with Darwin's idealistic approach to the life of society later became the source of the bourgeois ideologues' theoretical speculations.

In the Marxist view, the link between anthropogenesis and sociogenesis is neither the "miracle of creation" of the idealists nor natural selection, but labour in the dialectical unity of its material and inward aspects, which constitutes "the prime basic condition for all human existence".[1] The founders of Marxism did not limit their analysis to the physically perceptible, visible side of labour, which represents the universal, physical activity of mankind directed at transforming nature with the help of tools. They also pointed out several of its super-empirical, socially valued characteristics. In "The Part Played by Labour in the Transition from Ape to Man" Engels developed the idea, presented in Marx's *Capital*, that labour transforms not only nature but also man, the subject of labour. This is what led Engels to the discovery of the two-way relation, within the process of anthroposociogenesis, between the development of morphological organisation and physical activity aimed at transforming nature. His brief (and indeed never completed) article on the role of labour retains to this day its significance as a methodological guide and as a classic example of how dialectical materialism can be used to understand processes, such as anthroposociogenesis, which cannot be directly observed or experimentally duplicated.

[1] Engels, *Dialectics of Nature*, p. 170.

Natural Conditions for the "Desimianisation" of the Ape

In his *Dialectics of Nature* Engels formulated the ideas and methodological principles needed for a comprehensive study of the fundamental principles of nature and human history.

Having in mind what was then known about the astronomical, geochemical, and biological history of the Earth, and also contemporary ideas about our planet's place in the Universe, Engels gave special prominence to the following methodological tenet: although the lower forms of matter motion can be regarded in retrospect as the genetic basis and "material" of the higher forms, which grow out of the former and "absorb" many of their features, tendencies, and ways of functioning, it is nonetheless impossible to reduce the higher forms to a mechanical combination of the lower. Moreover, the emergence and development of each qualitatively new system within the material world has exerted a reverse influence on the aggregate of earlier systems.

In "The Part Played by Labour in the Transition from

Ape to Man", Engels was concerned in particular with the genetic aspect of the relation between matter and consciousness, the natural and the social. He showed that the emergence of man was based on the ages-long evolution of the biogeosphere and of the Universe as a whole. He also presented convincing proof that the rise of man and society was not the result of some immaterial absolute idea or abstract tendency towards "humanisation" in living beings, but a link in the law-governed process of the evolution of matter taking place in the Universe. For ages before it became a creator, the human mind was itself the creature of the biogeosphere's evolution as part of the Universe.

Engels argued that nature ineluctably creates and destroys the conditions in which the emergence and development of intelligent life is possible. In his view, reason, the thinking spirit, is an attribute of nature in the sense that when conditions in the external and internal environment are favourable they become the "goal" and product of the objective development of matter. And consciousness, in turn, exerts both a constructive and a destructive influence on the further evolution of matter. The character of this influence depends primarily on the type of social relations in a given society and the extent to which it has achieved mastery over nature.

In essence, what Engels demonstrated was the global principle of the organisation of matter in the Universe. This includes the genetic interrelation of the different forms of matter motion, subsumption of lower forms into higher ones, and (conversely) the congruence of newer forms with the environment in which they develop, represented by the aggregate of already existing forms.

For this reason the material basis for anthroposociogenesis could not have been confined to the realm of biology. The genetic conditions necessary for the birth of the social world were nothing less than all of nature, taken as a whole, and in particular the level of neuro-

psychic, anatomical, and physiological organisation achieved in the higher animals in the course of "prehuman" evolution. It was, of course, at the biological level that matter, in the course of its internal development, came up to the border of the social level. Nevertheless, it is unquestionable that every structural level of matter carries within itself, in what Hegel would have termed a sublated form, the results of all the evolution in the material world that preceded it genetically. Finally, the biological evolution of organisms as a condition for the rise of society did not proceed in isolation from the rest of nature, but was on the contrary an inseparable part of it. It was closely integrated, and genetically congruent, with the unitary system of natural processes both on Earth and in the Universe as a whole. This integrity of natural processes is denoted in modern science by the term "biosphere".

Turning to more recent research, we find Engels's ideas, as outlined above, confirmed and elaborated in the works of the Russian and Soviet scientists Konstantin Tsiolkovsky, Vladimir Vernadsky, Ivan Pavlov, Nikolai Vavilov, Pyotr Anokhin, and Nikolai Dubinin, and of many other scientists in various countries.

There are, objectively speaking, many facets to the deep interrelation between the history of the Earth and that of mankind, which manifests itself in numerous forms. Anthropologists concentrate on the transitions, turning-points, and ramifications that ecological changes brought about in the process of anthroposociogenesis. Physiologists take as their point of departure the unbreakable bond between the life processes of the organisms inhabiting our planet and the concrete natural conditions prevailing on it. The ecological conditions of life on Earth can be classed as constant (light, gravity, the make-up of the atmosphere, etc.) and variable (the seasons, climate, etc.). Organic (structural) and functional systems for supporting life were accordingly developed in the course of evolution.

As Engels rightly pointed out, the influence of the ecological factor on anthroposociogenesis must not be underestimated. But the absolutisation of this factor sometimes seen in the writings of scientists and (especially) popularisers is also methodologically unjustified. Changes in the ecological conditions in different regions of the planet are often cited as the chief cause of the rise of man and society. It is claimed that highly favourable or critical conditions had a decisive influence on man's zoological forebears. Engels, however, assigns the leading role to the characteristic motion inherent in matter. The conditions in which the development of matter passes into a qualitatively new phase are from the philosophical viewpoint secondary—albeit important—circumstances.

As we have seen, the intimate dialectical connections between the history of mankind and that of the Earth are of cardinal importance in analysing the ecological conditions in which man and society emerged. In recent years paleobotanical research has defined more precisely, both in time and in space, the boundaries of the repeated shifts in the climate of the Earth and of individual regions at the juncture of the Tertiary and Quaternary geological periods. New data have been uncovered on the ecological conditions under which anthroposociogenesis began and proceeded. It is now known that the Earth's magnetic poles have shifted four times in the past three to five million years. Breaks in the Earth's crust, particularly in the southeast of tropical Africa, laid bare outcroppings of uranium ores, thereby increasing sharply the radiation in the environment of the anthropoids whose remains have been excavated in that region.

This undoubtedly brought an upsurge in mutations and changed the hereditary "track" followed by these hominids. A recombination of the gene pool was obviously one of the main paths along which this radical biological restructuring proceeded. At any rate, modern

genetics has established with a fair degree of certainty that a steady reduction in the number of chromosomes accompanied the evolution of the primates and in particular of the hominids: from 78 to 54 in the lower apes, to 48 in the higher, manlike ones and 46 in man himself. The Italian geneticist Brunetto Chiarelli has put forward a hypothesis about the influence of two pairs of chromosomes and the strengthening of those that determined the development of the brain and the nervous system. The Romanian scholars Serban and Riscutia have suggested that one pair of chromosomes might, in some way not yet understood, have "dropped out" of further development, thus causing a characteristic regrouping of the chromosomes remaining.

It is possible that the functional differentiation of the brain's hemispheres began with the genetic restructuring of individual members of the hominid family.

Another theory about the initiating natural cause that finally produced a crisis in the purely animal way of life of the zoological ancestor common to man and the anthropoid primates is connected with a biological effect known as the Klüver-Bucy Syndrome. This effect was produced by penetrating radiation (characteristic of the caves in southern Africa where the remains of Australopithecus have been found); its medical and biological aspect consists in a change in the brain structure of individuals, consolidated by a recombination of the gene pool and a differentiation in the functions of the brain's hemispheres. This was accompanied by changes in the lower section of the spinal column that sharply reduced the grasping abilities of the lower limbs, thereby promoting their specialisation for walking.

The herbivorous higher primates subjected to radiation also displayed a sudden change in their behaviour patterns. They began to prefer meat to vegetable food, and became omnivorous. Their seasonal sex cycles disappeared; year-round fertility and desire for sexual in-

tercourse became characteristic of them. More importantly, a number of the species's inherited reactions were lost; to a certain extent, individuals were freed from blind obedience to purely animal instincts. An example of this was the breakdown of the hierarchy based on strength; the dominant male might be openly ignored when prey was taken, or might give up his "rights" in this situation.

At the same time, it would probably be a mistake to attribute the rise of man entirely to the "blind", mechanical workings of nature. The first beginnings of human history and its subsequent development should not be sought only in genetics, that is, in mutability, heredity, and selection.

Abstracting from details already known to science or not yet clear, it can be said that Engels was fundamentally right in asserting that the root cause of the lengthy and complex process that transformed "a particularly highly developed race of anthropoid apes"[1] into a human society was principally a change in their "mode of life". This was caused by ecological cataclysms and consolidated (as is now understood) by genetic changes in biological behaviour, the way "our hairy ancestors"[2] adapted to the world around them, beginning with the assignment of "different functions to the hands and the feet".[3]

This brings us to the question of the sequence and basic stages in the process that produced those psychophysiological conditions necessary for the emergence of modern man, who in Engels's figurative expression originated from "a troupe of tree-climbing monkeys".[4]

1 Engels, *Dialectics of Nature*, p. 170.
2 Ibid., p. 171.
3 Ibid., p. 170.
4 Ibid., p. 175.

The Hominid Triad: Erect Posture, Development of the Hand, and Development of the Brain

In *The German Ideology*, an early joint work not published in their lifetime, Marx and Engels formulated materialist principles for analysing the life of society, and stated that the first condition necessary for society is the existence of man of the modern physical type. "The first premise of all human history," they reasoned, "is, of course, the existence of living human individuals. Thus the first fact to be established is the physical organisation of these individuals and their consequent relation to the rest of nature."[1]

Thus the "physical organisation" of human individuals is the primary, material basis of their social, as well as natural, existence. Having become an element in society, man remained a part of nature. Indeed, nature became the premise for a new type of vital activity, or way of life, of human beings—one that is qualitatively different from that of the animals. This way of life revolves around the production of what is needed to maintain life (including the means of production), and hence around social organisation.

The genetic tie between the structure of the human body and the morphology of his nearest animal ancestors had been clearly perceived by Darwin and his contemporaries. In "The Part Played by Labour in the Transition from Ape to Man", Engels spoke of the fruitfulness of this idea, which the church had condemned as sinful, and with surprising penetration interpreted this natural fact in the light of dialectical materialism. He argued convincingly that the biological side of this problem has a philosophical aspect as well. The task of the philosopher is to reveal the dialectically contradictory character of the objective process through which

1 Marx and Engels, *Collected Works*, Vol. 5, 1976, p. 31.

the anatomical and morphological structure of the higher animals (especially of the hypothetical common ancestor of man and the anthropoid apes) is transformed into the biological and psychical organisation of *Homo sapiens.*

Science is continually furnishing new confirmations both of the biological unity of man and the animal world and of their deep evolutionary divergence. Many of man's organs correspond to those of the higher apes and yet differ from them. As Darwin himself believed, the chimpanzee is closer to man in anatomy and behavior than any of the other primates.

At the same time there have been various attempts—all fruitless—to absolutise the similarity between the primates and man in physical organisation and to interpret the link between man's anatomical and physiological structure and that of his animal forebears from the standpoint of vulgar materialism. In particular, a number of bourgeois biologists have frequently underrated the deep qualitative difference between man and ape as manifested in a whole series of highly significant characteristics: the level of development and functional differentiation of the brain's hemispheres, the second signal system, man's purposive changing of his environment, the lessening effect of selection, etc.

Engels thought it was a change in the way of life of man's long-extinct ancestors that served as the objective condition for a corresponding change in their anatomical and morphological structure, and this idea has emerged triumphant in modern science. Engels did not limit himself to a general characterisation of how man's ancestors, known from fossils, underwent a biological restructuring in the direction of humanisation. With "The Part Played by Labour in the Transition from Ape to Man" he became the first scholar in history to articulate the basic links and stages in this process. Over the past century, disciplines such as paleoarchaeology, paleoanthropology, and paleoneurology have confirmed Engels's

main ideas about the successive development of the upright posture, the hand, and the brain, and about the way these reinforced one another. In other words, at the different stages in anthropogenesis the leading and decisive factor has been the preeminent development of whichever element it was that represented a new step in the interaction with nature and opened up new horizons for labour and for sociality.

In most animals the functions of the front and back legs are wholly undifferentiated, or differentiated only to a small degree. There is, however, evidence, preserved in the paleontological "archives" of evolution, among the extinct species, that some of the reptiles of the Mesozoic (in particular the *Ornithopoda* and *Sauropoda*) developed effective means of locomotion. They even ran and jumped on their back legs, supporting themselves when necessary with their massive tails. Their five-fold forelimbs were used mainly to supplement the jaws in seizing and holding food. The dinosaurs, of course, were one of the dead ends of evolution; they gradually gave way to more advanced forms of life, and in particular to the mammals, among which the apes undoubtedly display the greatest differentiation of front and rear extremities.

Engels noted that all of the anthropoid apes are able to move about on their legs alone, but actually do so only when absolutely necessary, and clumsily at that. This "reserve" of evolutionary potential could be realised only if extraordinary circumstances made the development of this incipient ability a necessary condition for the survival of the species. Recalling Darwin's theoretical reconstruction of the physical makeup of exceptionally highly developed anthropoid apes at the end of the Tertiary geological period, Engels wrote: "Climbing assigns different functions to the hands and the feet, and when their mode of life involved locomotion on level ground, these apes gradually got out of the habit of using their hands (in walking—*Tr.*) and

adopted a more and more erect posture. This was *the decisive step in the transition from ape to man.*"[1]

The significant gains made by primatology in recent decades, and also new excavations in Africa, make it possible to fill in the details of this idea, which Engels presented more or less in outline form, as a supposition.

Paleobotany has confirmed that a significant change took place in the climate, flora, and fauna of the tropical regions towards the end of the Tertiary period, and this no doubt led to a reduction in the arboreal specialisation of some of the higher apes. It might be said that their evolutionary "reserves" were brought to bear on adapting to the new conditions. In particular, there would be a compelling natural stimulus for the rear limbs to assume the function of support if the front limbs were "busy".

But busy with what? After all, millions of years separate this period from the first forms of what can properly be called human labour. One answer involves the throwing of stones, sticks, nuts, and the like. This may be done in defense against an enemy, in mounting an attack, or in order to knock fruit down from trees. While bombarding an object two or three metres away, the ape usually supports itself on three legs, while gazing steadily at the target as if taking aim. The establishment of this means of acting on other animals from a distance would seem to presuppose development of an upright posture. The new stance was assumed with greater and greater assurance. The beginnings of this can be seen in the way the great apes move from tree to tree or (especially) through shrubbery.

Another circumstance that may have promoted development of the erect (orthograde) posture is the semi-upright gait apes use in carrying food, which they do mainly with their front paws when the load is heavy

[1] Engels, *Dialectics of Nature*, p. 170.

or cumbersome.

Of considerable importance in accounting materialistically for the establishment of a two-legged gait (bipedalism) among man's prehistoric ancestors is the assumption that a need arose for a supplement to the vegetable diet, which would be rather scanty outside the forests. Insects, small amphibians, eggs, birds and their nestlings, fish, molluscs, and so on became regular foods. All of this, and also the gathering of fruit growing on high branches, demanded that the centre of gravity be shifted to the rear extremities, thus helping to promote and perfect their use for support.

The sharp decrease in the amount of tree growth to be found in the savanna, as compared with the tropical forest the apes inhabited earlier, is not the only possible circumstance that may have forced them to adopt an upright posture at the end of the Tertiary period. It may well be supposed that a move into mountainous territory (or the formation of mountains in an old habitat) made it necessary for them to climb steep slopes while holding on (and carrying food) with their hands. In coastal areas bipedalism could have been promoted by the need to go farther and farther into the water to gather molluscs, crabs, and other animals earlier collected on the beach at low tide.

The rise and establishment of bipedalism was a gradual and lengthy process. Like a child that has just learned to walk, the prehistoric anthropoids probably went back down onto all fours from time to time. At first, this provided a faster means of locomotion—and more importantly, one that was easier and more accustomed. It is not impossible that the psychic mechanisms of demonstration and imitation, which are so well developed in the higher apes, played a significant role in mastering the erect posture.

The daring British researcher Jane Goodal has recently spent a number of years living close to, and on the best and most trusting terms with, several groups of

chimpanzees inhabiting one region of Tanzania. Many of her observations are of a truly unique value. In particular, she established that chimpanzees spend considerably more time on the ground than was earlier supposed. They can hit targets with sticks and stones. They often supplement their vegetable diet with termites dug out with specially gnawed twigs and hunt for small game; on occasion they kill wild pigs and mountain goats. Goodal established that chimpanzees use chewed grass as a sponge to collect water in the hollows of trees, and often walk on their hind legs when going somewhere in a group.

The erect posture, in its turn, caused anatomical and morphological changes in the bodily organisation of man's prehistoric ancestors. As the foot lost its grasping function, it flattened and developed a longitudinal arch, which eased the burden on the spinal column in running and jumping. David Pilbim of Yale University has put forth a hypothesis concerning changes in the spine. It is possible that the structure of the spine of the Australopithecines (and evidently of their immediate predecessors) changed in accordance with the means of locomotion on which their way of life was based. Thus the original six vertebrae were reduced to three or four in chimpanzees and gorillas, while their number increased in *Homo sapiens*. In the latter case, this evolutionary change was accompanied by a strengthening of the spine, disappearance of the tail, and expansion of the pelvis and thorax. (The last of these increased the brain's oxygen supply.) There were also changes in the skeleton and musculature. The bones, and especially the skull, became thinner, making it possible for the brain to grow and change in structure. The face became shorter; the jaws and teeth, smaller. Stereoscopic vision appeared; the brain's motor centres were enhanced; and so on. The most important change, though, was—as Engels wrote—that "*the hand had become free* and could henceforth attain ever

greater dexterity".[1] This in turn helped to encourage the erect posture.

Hegel was among the first to draw attention to the human hand as a transformer of nature, a function that makes it the primary natural means through which man contacts the outside world, communicates with it, and constructively changes it. In *The Philosophy of Law*, where he discusses the part played by production in human life, Hegel writes that "the hand is that great organ which no animal has, and what I can take hold of with it can itself become a means for me to reach out further".[2]

Viewed schematically, then, the hand is an intermediary between man's body (a group of natural organs for acting on external nature) and the outside world. At first man uses his hands to secure his primitive, biological needs; later he comes to use them for ever more complex material-technological and socio-cultural tasks. Through the use of the hand, the outside world is divided into objects that operate as man's helpers and objects that are acted upon—that is, into the instruments and objects of labour. In a word, the irreplaceable intermediary between the intention directed "against" nature and nature itself is a natural tool capable of creating artificial tools—the human hand.

The idea that it was the evolution of the hand which played the decisive role in man's final breaking away from the animal world and his transformation of the surrounding world was given a dialectical-materialist development in the classics of Marxism-Leninism. The force that turned the ungainly paw of the ape into a human hand, capable of a master's virtuosity, was labour using tools. It is due solely to labour that the human hand, its instrument and product, has

[1] Ibid., p. 171.
[2] G.W.Fr. Hegel, *Grundlinien der Philosophie des Rechts*, Berlin, Duncker & Humblot, 1840, p. 91.

attained what Engels described as "the high degree of perfection required to conjure into being the pictures of a Raphael, the statues of a Thorwaldsen, the music of a Paganini".[1]

Engels showed consummate perception in distinguishing between the function of the human hand and that of the ape's paw. The principal difference lies in the making of tools in advance for the purposeful, creative transformation of the environment, which is unknown in the animal world. "Many apes use their hands to build themselves nests in the trees or even to construct roofs between the branches to protect themselves against the weather, as the chimpanzee, for example, does. With their hands they grasp sticks to defend themselves against enemies, and with their hands they bombard their enemies with fruits and stones. In captivity they use their hands for a number of simple operations copied from human beings. It is in this that one sees the great gulf between the undeveloped hand of even the most manlike apes and the human hand that has been highly perfected by hundreds of thousands of years of labour. The number and general arrangement of the bones and muscles are the same in both hands, but the hand of the lowest savage can perform hundreds of operations that no simian hand can imitate—no simian hand," Engels summed up aphoristically, "has ever fashioned even the crudest stone knife."[2]

In themselves, the anatomical and morphological changes undergone by the arms and its functional "point," the hand, were not as dramatic as, for example, the restructuring of the brain or the transformation of the bodily organisation of our prehistoric forebears brought about by their adoption of the erect posture. In the overall view, the change that took place in the hand came down to a series of significant alterations. There

[1] Engels, *Dialectics of Nature*, p. 172.
[2] Ibid., p. 171.

was an increase in the length, and in the mobility of the fingers, and especially of the thumb relative to the palm. A corresponding change took place in the structure of the muscles; this brought greater flexibility and made possible a wider variety of positions and functions (variability). The hand became capable of performing delicate tasks. There was an increase in sensitivity at the expense of crude grasping power, and the claws gave way to flat nails.

Most importantly, the workings of the hand gradually came to hold a dominant place in providing for the vital needs and security of man's remote ancestors. It seems likely that the functional development of the hand (a natural biological tool to which natural inorganic tools—stone, for instance—were "appended") proceeded with great intensity, exceeding the speed (and more importantly, the horizons!) of purely biological evolution by several orders of magnitude. The pebble tools that have come down to us (those of bone and wood are necessarily less well preserved) are sometimes hard to distinguish from fragments produced by the action of natural forces such as water, wind, and variations in temperature. It has nonetheless been established beyond any doubt that the finds uncovered in the Olduvai gorge (Tanzania) represent a stone-working industry approximately two million years old.

The hand became an instrument of labour, discovery, and communication (through gestures). Man's ancestors threw stones at the animals they hunted, or against which they needed to defend themselves. With their hands they fashioned the first tools from stone (or possibly bone, horn, or wood). Their hands kindled the first fires for cooking and warmth, and prepared the fuel that sustained them. The hands were used for signaling and exchanging information through gestures, which were reinforced (and later replaced) by the voice, and later by writing. Finally, it was with their hands that early men attempted, in drawings on the walls of

caves or on nearby cliffs, to express their nascent esthetic perceptions of the world and their subjective feelings about its variety and dynamics.

Thus the establishment of the erect posture both promoted and presupposed a significant broadening of the functions performed by the forelimbs of the oldest hominids and a radical change in those functions, even though the limbs themselves did not undergo any great anatomical changes for a long time. It seems that at first they performed the new tasks in their earlier biological form, and indeed their later evolutionary transformation was not really radical.

What was it "within" the organism that served as the driving force in the functional development of the hand? The brain was, in terms of evolution, the "newest" organ in the human body, and hence the most plastic and dynamic. The sense of touch was developing, and the habit of feeling objects, dividing and uniting them, placing them one onto another, moving them around, etc., became stronger. Over a long period of evolution all of this, together with coordination between the right and left hands and between motor and manipulative activity, combined with other factors, was somehow "imprinted" by the central nervous system, and this promoted its further development.

The dialectical interaction of perception by the eye and the hand in the process of evolution advanced the development of both organs. Engels expressed in striking language the fundamental distinction between the vision of man and that of the most keen-sighted of birds: "The eagle sees much farther than man, but the human eye discerns considerably more in things than does the eye of the eagle."[1] One of America's leading psychologists, Jerome Bruner (of Harvard and later of Oxford) argues convincingly that it is possible to speak of "the integration of the world of the hand and the world of vision".[1] A Soviet medical textbook aptly describes the eye as a part of the brain advanced to a front position.

[1] Ibid., p. 174.

The research of the past several decades has shown that in the last stages of anthropogenesis it was not so much the mass of the brain as its structure, the level of its morphological organisation, that came to play an ever more decisive role. The classical Neanderthal, for example, had a brain mass equalling—and sometimes surpassing—that of modern man.

One of the principal methods used in reconstructing the brain's evolution is the study of so-called endocranial prints. Copper sulfate and elastic substances are poured into fossil skulls, and the resulting film is withdrawn through the foramen magnum. The relief of the brain's convolutions and the blood vessels of the dura mater is thus reproduced to within a hundredth of a millimetre. Of course the study of such prints does not give a complete picture of the internal structure of the brain, but it makes it possible to determine quite exactly the volume of the brain and also the main trends in its development, in particular the areas of most intensive growth. Furthermore, comparative study of the brain's structures reveals the genetic sequence in which its basic regulatory functions arose.

Psychiatry and neurosurgery, which deal with patients who have lost different brain functions as a result of damage to various parts of that organ, also provide significant material about the evolutionary relationship between the older and newer structures in the brain's cortex and about their "responsibility" for different aspects of the organism's functioning.

As noted by the Soviet scholars Veronika Kochetkova and Vladimir Yakimov, the brains of primates display a new, predominantly radial arrangements of the princi-

[1] Jerome S. Bruner, *Beyond the Information Given*, New York, Norton, 1973, p. 271.

pal convolutions, qualitatively different from the circular arrangement found in the other orders of mammals. There is also an increased tendency towards enlargement of the hemispheres. In both these respects the brain of the hominids, while retaining continuity with earlier evolutionary stages, has gone in somewhat different direction. There was a marked broadening in the range over which it might be modified during an individual's lifetime depending on the type of activities pursued. During pre-natal development the human brain reaches only twenty-five per cent of its eventual volume, while that of the chimpanzee, the animal closest to man in this respect, reaches sixty-five per cent of its eventual volume.

The evolution of the brains of our remote ancestors began in connection with their upright gait, the development of the hand, the improvement of the tactile sense and vision, etc. A readjustment took place in the motor centres of the brain. It was these anthropoids' manipulation of objects in their environment that gave the decisive impetus to further development of the brain. The new functions brought by a widened range of increasingly social tool-making activity led to the formation of new structures in the cortex of the brain's hemispheres.

Modern science is learning more and more about the truly universal range of the brain's capabilities and functions. On the whole, these discoveries confirm the idea that the human brain is, in essence, a unique concentration of biological evolution "built into" the individual organism. Its creative potential and ability to assimilate culture are literally boundless.

It is hypothesised that the fifth and second pairs of chromosomes, which are "responsible" for the development and functioning of the brain, "merged"—and hence became more powerful—during the recombination of the early primates' gene pool. It may be that this is what prompted the gradual enhancement of the mammalian

nervous system previously evolved. These fundamentally new structures of nervous impulses were a biological prerequisite for the later rise of conceptual thinking. The differentiation of the functions performed by the cortex of the two hemispheres played a significant (and not yet fully understood) role in the evolution of the brain. It has been determined by science that their specialisation consists particularly in the predominant use of rational or emotional, temporal or spatial channels in dealing with the external world. It has recently become clear that in essence the brain is a paired organ, just as the hands are.

Here it may be noted that a number of bourgeois authors regard the brain's evolution idealistically, in isolation from the emergence of labour, and thus have tended to ignore the main processes through which the brain's inner structure and architectonics were reshaped, centring their attention on its size alone. Robert Ardrey, for example, concludes that the human brain, having achieved physiological "readiness", spent half a million years idly waiting its time. It was, as he puts it, as if people who had not yet learned about petroleum products had been presented with a Rolls-Royce.[1]

Carl Sagan, an American astronomer and seeker of extraterrestrial civilisations who has published a book with the pretentious title *The Dragons of Eden*, makes a vulgar-physiological comparison between the structure of the human brain and a palimpsest from which an ancient text can still be read under what was written later. He maintains that aggression and attachment to ritual are genetically conditioned by a part of the brain inherited from the reptiles, which is called the "R complex". Altruism and love, by contrast, are connected with the limbic system that developed in the mammals, and the faculty of foresight is concentrated in the frontal lobes,

[1] Robert Ardrey, *The Social Contract*, New York, Atheneum, 1970, p. 352.

a relatively recent formation. Sagan claims that in a very real sense, civilisation can be regarded as a product of the frontal lobes.[1] Characteristically, these authors have not a word to say about labour as a cooperative effort to transform the environment with the help of tools. They consider the development of the brain in isolation, as a purely physiological process, and this allows them to engage in all sorts of mystifications. For example, the aggressiveness that characterises antagonistic societies is blamed not on the socio-economic (and especially capitalist) relations that engender it, but on ancient reptiles, which are claimed to have left a sinister vestige of their bloodthirstiness in the brain of every human.

What can modern science tell us about the moulding of the human brain and the sources of its genetic evolution? How did this process begin, and what were its general outlines?

Comparative study of endocranial prints has shown that the intensive growth of the brain (which was tied with natural selection according to inclination towards tool-use and success in this activity) began simultaneously in two centres. The first is the lower sincipital, which in modern man is linked with coordinating the action of the hands. The second is the lower frontal, which corresponds to the motor zone used in speech (the Broca centre). The next stage was marked by an enlargement of the zone of intensive growth through the rise of two new epicentres: the temporal and the paracoronal (first of all the Wernicke centre). It is the latter which provides for the comprehension of speech. Adjoining it is the so-called angular convolution, which is situated at the juncture of those sections of the cortex which regulate vision, hearing, and the sense of touch, thus opening the way for integration of data coming from the external world. The relief of the brain's surface also grew more complex with the continuing advance of

[1] Carl Sagan, *The Dragons of Eden*, New York, Random House, 1977, p. 71.

labour, thought, and speech. It was only in the final stage of anthropogenesis (the evolution of the brain) that the development of the prefrontal sections took place. In the lower apes the frontal lobes constitute ten per cent of the cortex; in the higher apes, the figure is below fifteen per cent; in man, about twenty-five per cent.

"First labour," Engels wrote, "after it and then with it speech—these were the two most essential stimuli under the influence of which the brain of the ape gradually changed into that of man, which for all its similarity is far larger and more perfect."[1]

Engels, of course, was not an anthropologist or a paleontologist, but the methodological principle he formulated more than a century ago, the hominid triad (erect posture, development of the hand, and development of the brain), has nonetheless been confirmed again and again in the swift progress of modern science.

Engels on "Transitional Beings" and the Conception of the Two Steps

The emergence of man in his modern physical type could not have taken place outside the framework of the dialectically related process through which society was formed. The latter process had distinctive stages of its own, and it was Engels, in "The Part Played by Labour in the Transition from Ape to Man", who first uncovered its methodological contours.

In the works of modern scientists the date given for the emergence of "fully fledged" man varies over a very wide range: from twenty million to twenty-five or thirty thousand years ago. Anthropologists, archaeologists, physiologists, psychologists, ethnographers, historians, and philosophers typically make their estimates according to different criteria. The methodological reason for

[1] Engels, *Dialectics of Nature*, p. 174.

the gigantic divergences in the dates given is that researchers either take in the whole process of anthroposociogenesis from one terminus (the animal world) to the other (human society), or seek only to date its "turning point".

Our concern here is with the dialectical-materialist understanding of the transition itself, with allowing for the contradiction between continuity and discreetness in the development of living matter. This idea runs all through Engels's *Dialectics of Nature*. The interconnection of the basic forms of matter motion presupposes that the lower forms are "included" in the higher ones, and at the same time that one form cannot be reduced to another. Nature, Engels believed, does not take leaps; they make up the very "fabric" of nature's integrity. And yet, "in spite of all gradualness, the transition from one form of motion to another always remains a leap, a decisive change".[1]

Between the time when our ancient simian ancestors "straightened up" and took stones into their hands and the time when man emerged in "full-fledged" form lay a vast historical period of transition. The rise of man and society was not a distinct act, not a boundary crossed or a leap made across the gulf between the animal world and society, but a process, one that was long, contradictory, and dramatic. Thus it is impossible to give an exact date for man's emergence. All that can be done is to set forth the time frame of anthroposociogenesis, its main stages, and the laws that governed it.

Engels advanced the fruitful idea that in the distant past there existed "transitional beings", who were a sort of link between the animal and social worlds and at the same time defined the boundary between the two, which stretched through time and had its own internal contradictions and dynamism. He believed that the "break"

[1] Engels, *Anti-Dühring*, Moscow, Progress Publishers, 1978, p. 85.

with the animal world, the step that left behind the "troupe of tree-climbing monkeys",[1] was connected with the development of our simian ancestors, whom he describes as "gregarious". A change in natural conditions forced them, in order to survive biologically, to make regular use of non-organic objects such as stones, sticks, and bones. The stage at which anthroposociogenesis was completed and "real" people and society emerged resulted from the progressive evolution of "man in the making".[2]

Engels's idea that the change from the biological to the social took place in two stages, and the hypothesis that "transitional beings" must have existed in the remote past, played an important methodological role in the establishment and development of Marxist anthropological science. They find reflection and confirmation in the conception of a two-step process of anthroposociogenesis, which is now almost universally accepted.

By the logic of this conception, the first step was the transitional beings' gradual breaking away from their animal existence. They moved "outside" the animal world during a process of adaptation based on the reflex use of tools. The psychoanatomical structure of these transitional beings was taking shape at the same time. A specific type of vital activity became characteristic for them: they use rudimentary tools. The primeval herd advanced towards internal self-organisation. The "increasing clarity of consciousness" became an instrument for psychic orientation in the outside world, and chattering came to serve as a means of communication within the group. The second step was the rise of "full-fledged" man, and of primitive community organisation as a specific, social form of vital activity, a field for the action of social relations and laws.

From the point of view of modern science, it seems

[1] Engels, *Dialectics of Nature*, p. 175.
[2] Ibid., pp. 171-76.

appropriate to connect the initial step in the rise of man, "desimianisation", with the existence of the Australopithecines, whose fossilised remains were first discovered in South Africa by Raymond Dart in the early 1920s. The Australopithecines walked upright and used the bones and teeth of animals they had killed (and probably unworked stones as well) as weapons for the hunt. By all appearances, however, they had as yet no real tools and did not know how to use fire.

In essence, the movement towards a "break" with the animal world lay in the emerging contours of a new and more complex relation between individuals and the environment, one that held great evolutionary promise. As instinctive forms of labour came into existence, external objects came to be divided, as it were, into two categories. The first were products used directly for feeding (acquired through gathering or rudimentary hunting). The second were inorganic objects, among them objects used for securing food and for defence against predators. The first of these systems of vital activity, "anthropoid–nature", had little flexibility. The second, "anthropoid–natural object serving as an intermediary" (that is, as a sort of natural tool), possessed an evolutionary plasticity and carried the potential of saving a species faced with extinction.

The Australopithecines themselves were changed by their interaction with nature. The establishment of the upright posture was accompanied by a development of the constructive functions of the hand, supplanting of the teeth and nails as the predominant natural tools, development of the nervous system and the brain, and intense stimulation of the "reserve brain" characteristic of the higher primates. There was a deep contradiction within the peculiarly twofold Australopithecine way of life. The dominant tendency was connection with the animal world, membership in it, evolutionary continuity. Opposed to this was the tendency to diverge, "move away", from the animal world, to go beyond it through

the emerging forms of a new way of life. There was rapid progress in the gathering of food, including rudimentary hunting, and in the seeking out, adaptation, and use of tools both organic (wood, bone, and horn) and inorganic (stone) in origin. There was no gulf separating these primates from the animal world; they continued to live primarily within it, as had their ancestors, and for the time being their development proceeded within this framework. The main changes were in the elements of their way of life, and occurred in the late Tertiary and early Quaternary periods. The relation to nature continued to be dominated by immediate consumption, although this was limited to a significant extent by the rise and advance of a new, non-animal relation between living beings and natural objects not used directly for the satisfaction of biological needs. Here begins the dialectical interaction between non-animal trends and those that can properly be called social.

In its purely biological form, the problem of "transitional beings" was raised as early as the years between 1859, when Darwin's *Origin of Species* appeared, and 1871, when *The Descent of Man and Selection in Relation to Sex* was published. The noted naturalists Carl Vogt, Thomas Huxley, and Ernst Haeckel, who enthusiastically supported Darwin, analysed the genetic tie between man and the higher primates and suggested that man was not directly descended from the apes, but rather from an ape-man, a "Pithecanthropus without the faculty of speech". This was a sort of hypothetical species, neither an ape nor a man. Darwin's contemporaries had different ideas about their "deduced" Pithecanthropus (the name has become established in science). Haeckel was convinced that man was most closely "related" to the gibbon; Huxley thought Pithecanthropus was more like a gorilla; Darwin looked toward the chimpanzee. Modern science confirms the last of these opinions.

In Engels's own lifetime, fifteen years after the writ-

ing of "The Part Played by Labour in the Transition from Ape to Man", the young Dutch physician Eugène Dubois went to Indonesia to look for the remains of Pithecanthropus. Soon he had found, in layers from the Quaternary period on the island of Java, near Trinil, a skullcap, two molars, and a femur belonging to a race of ape-men. The femur indicated that these animals had walked upright, with knees slightly bent; the volume and internal relief of the skullcap place the species Dubois had uncovered roughly halfway between ape and man.

The "beginning" of the stage transitional to man and its border with the process by which prehistoric apes were "desimianised" is now largely associated with the finds made in the Olduvai Gorge by Louis and Mary Leakey, which represent a species intermediate between Dart's Australopithecus and Dubois's Javanese Pithecanthropus. This species was given the name *Homo habilis*, or simply *habilis*. It is supposed that *habilis* began to make primitive tools from stone, and thus stood on the threshold of the long process of humanisation.

According to the findings of modern science, the "end" of the transitional stage and the onset of humanisation in the proper sense is represented by Sinanthropus, sometimes called Pithecanthropus pekinensis for the site of the excavations. The remains of forty individuals have been found; judging by them, Sinanthropus was more developed than Pithecanthropus of Java, to say nothing of the Olduvai habilis. Nonetheless, this hominid did not equal Neanderthal, although he made the first stone tools, knew the use of fire, built hunting camps, and so on.

In any case man's ancestor "grew" about 30 cm during the transitional stage, and the volume of his brain increased by approximately 50 per cent. It may be supposed that this was the time when the change was made from the use and adaptation of natural tools to the creation of artificial ones, and in particular of the chisel, a tool-making tool. There was also a qualitative change

in the interaction between individuals; social relations in the proper sense begin to emerge from the evolution of the primeval herd.

The primeval herd was a local population group; it was characteristic of the stage transitional to man in the process of anthroposociogenesis. It underwent a long evolution, and contained two more or less autonomous structures of ties and behaviour among individuals. The first of these was the system that provided immediately for the biological needs of individuals: the consumption of "ready-to-eat" natural products, sexual intercourse, and the propagation of the species. The second system held the seeds of mediated interaction by individuals among themselves and with nature. It served to satisfy the particular demands characteristic of individuals of this species: the use of tools, communication with the aid of biologically neutral signs, and the like. These constituted a superstructure on instinctive and reflexive behaviour; it was from them that collective activity was later to be born.

The same individuals were simultaneously involved in both the biological system of relations and the embryonic social one. When they picked wild fruit with their bare hands, or knocked it down with sticks, or picked up stones lying on the ground and threw them at an animal, their instinctive labour was externally little different from the behaviour of the higher primates, to which it was essentially analogous. But when they made tools (even the most primitive ones), communicated through signs, pronounced words, tended and procured fire, shared the food they had obtained, took care of one another, and carried out rituals, they were behaving like genuine humans. Little by little the elements of a new way of life came to play an increasingly substantial role among them; here was the beginning of what was later to constitute sociality as a feature of truly human existence. This thesis is confirmed by recent studies of the oldest Paleolithic camps in the Olduvai Gorge, con-

ducted by American and Japanese scientists using factor-analysis methods. The materials they gathered were processed by a computer.[1]

Finally, "man in the making" can, in the light of modern scientific views, be tied with Neanderthal man, whose development reached its end when this type was supplanted by the "full-fledged" Cro-Magnons and the clan based on blood ties, the first form of social organisation known to history.

Certain bourgeois authors often indulge in obvious modernisation of the Neanderthal. They present him as a fully formed human being, differing from our contemporaries only in appearance and demeanour. They make it seem that if a Neanderthal were suddenly to return to life, no more than a shave and a smartly tailored suit would be needed to make him fit right in on a New York subway platform or in a Paris college. Their books often portray a sort of Paleolithic hippy, lost in introspection or contemplating the world around him, or a fossil individualist with the habits of a businessman. Another caricature shows us a psychopathic brute, possessing enormous strength but unable to contain his emotions; blinded by his hatred of everything and everybody, he is forever brandishing the stout club he uses as an aggressive weapon against others of his kind.

It is not hard to see that such psychological "portraits" of the Neanderthal are not so much a burlesque of man's remote ancestors as actually existing types engendered by bourgeois society. The bizarre transposition to the dawn of history is made with an eye to presenting these types as something primordial, born of nature itself. This entirely disregards (or conceals) the objectively existing connection between the rise of man and the laws governing the development of labour.

Nonetheless, it was during the Neanderthal stage that

[1] P. M. Dolukhanov, *Geografia kamennogo veka* (The Geography of the Stone Age), Moscow, 1980, pp. 20-42.

the tie between the individual and the tool gradually established itself as an ever more necessary and reliable means of maintaining equilibrium with the external world. There was an increasingly stronger tendency towards the purposeful transformation of nature in the process of establishing the elements of social existence.

The functions of tools became broader and the processes through which they were made and put to use acquired a more complex structure. These processes necessarily influenced the malleable, biopsychological nature of man's ancestors. The conditions required for the rise and development of the ability to engage in cooperative labour came into being. Man realised with increasing clarity that he could not provide for his biological existence without labour, or outside of it. His ability to work and the need to do so became ever more closely tied in his psyche with the possibility of using inanimate objects to provide materials, energy, and information needed for labour. In completing his development as an individual and an element of society, man became a subject of labour and of the social relations based on it.

Genesis of Labour: Tools, Hunting, and Fire

Labour was the decisive force guiding the process through which man of the modern physical type emerged from the ancestors of the higher anthropoids. We will briefly consider the sense in which man can be called a product of labour, keeping in mind that Engels believed labour itself to have arisen in the process that gave birth to man and society.

What is labour, which Engels described as "the prime basic condition for all human existence"[1]? An extended answer to this question is found in Karl Marx's main

[1] Engels, *Dialectics of Nature*, p. 170.

scientific work, *Capital*: "Labour is, in the first place, a process in which both man and nature participate, and in which man of his own accord starts, regulates, and controls the material re-actions between himself and Nature. He opposes himself to Nature as one of her own forces, setting in motion arms and legs, head and hands, the natural forces of his body, in order to appropriate Nature's productions in a form adapted to his own wants. By thus acting on the external world and changing it, he at the same time changes his own nature. He develops his slumbering powers and compels them to act in obedience to his sway."[1]

Marx notes certain similarities between labour and the vital activities of animals. The latter are indeed characterised by metabolic interchange with the environment, changes in (or the destruction of) a specific type of natural object through the use of bodily organs and innate powers, etc.

In *Capital* Marx suggested that there existed in the remote past "primitive instinctive forms of labour that remind us of the mere animal", and mentioned a hypothetical "state in which human labour was still in its first instinctive stage".[2] The subject of his research in *Capital*, however, was "labour in a form that stamps it as exclusively human".[3] Marx called attention to the mental side of labour, which is absent in the animal world: conscious purpose, concentration, will-governed effort by bodily organs, and the possibility of enjoyment that comes with exercise of bodily and mental powers.[4]

Marx also gave further development to the idea that some sort of evolutionary "thread" had once helped to overcome the genetic gulf between animal labour and human labour in the proper sense. In Chapter XV of *Capital* (Volume I), in a discussion of the origins of machines, he returned obliquely to the same analogy: "Darwin has interested us in the history of *Nature's Technology*, i.e., in the formation of the organs of plants and animals, which organs serve as *instruments of production for sustaining life*. Does not the history of the productive organs of man, of organs that are the material basis of all social organisation, deserve equal attention?"[1]

As applied to the process through which man and society arose, this thesis suggests that there was a special link between the "natural technology" of the ancient hominids and the artificial technology that gradually became a "second nature" for man. In "The Part Played by Labour in the Transition from Ape to Man", Engels shows that such a transition was plausible and suggests that joint tool-using activity could have constituted such a link.

It was not just any sort of vital activity among the animals that held in it the roots of labour, but a special form that could be carried out only by a certain variety of ancient primates. Little by little, it came to be based on actively influencing the environment. Engels showed that labour, in its origins, was connected with a special form of biological adaptation to the environment among the higher anthropoids. They were able to obtain the necessities of life because of the evolutionary improvement of natural organs of labour. They developed the habit of manipulating various objects, including (and this is most important) ones that were inorganic and inedible. This was made possible by their anatomy, and in particular by the flexibility of their nervous system. The manipulation of objects became an essential element in the vital activities of man's forebears and yet did not lead to the specialisation of their natural organs of labour (the hands, feet, and teeth).

The manlike apes threw sticks, stones, and fruit at

[1] Karl Marx, *Capital*, Vol. I, Moscow, Progress Publishers, 1978, p. 173.
[2] Ibid., pp. 173-74.
[3] Ibid., p. 174.
[4] Ibid.

[1] Ibid., p. 352, note 2; my italics.—*Author.*

other animals, and this fact enabled Engels to create a model of the very beginning of what later became labour. Man's forebears made episodic, and then systematic use of certain objects and forces in nature; these came to be a more and more essential supplement to their natural organs, allowing them to attack other animals, defend themselves against predators, and prepare the food they obtained. Thus for these ancient beings the external world was "divided" into two spheres: biologically significant objects confronting them directly, and biologically neutral objects and forces in nature, especially inorganic ones. The latter were used as intermediaries and "helpers" in providing for the necessities of life. With the emergence of man and mankind, they too came to be differentiated.

Modern scientists studying the genesis of tools-objects taken from the environment and used to act on other objects—look to the behaviour of the higher man-like primates, just as Engels did. Such animals are capable of rudimentary construction such as nest-building, of using sticks to reach food, of throwing objects and wielding branches to defend themselves, and so on. When they consider the beginnings of hunting, however, scholars often look for its genetic origins among predators such as the African hyenas, which hunt in packs. It is in the instincts of such animals that certain scholars have sought the prototype of coordinated activity: surrounding the prey, running it down and killing it, and then dividing it, allowing a share to pups and animals that took no direct part in the hunt.

In order to reconstruct the genesis of labour—at first episodic, then more and more regular, involving the use of external natural objects—Engels undertook an analysis of certain behaviour patterns among the higher apes. Of course a gap does exist between the labour-like instincts of animals and the first animal-like, instinctive forms of labour. But there is no chasm that could not be bridged by evolution. Attempts to extrapolate directly from the

behaviour of herd predators to the formation of hunting bands among emergent men hardly seem convincing. The ties between the change from using natural tools to making artificial ones, the harnessing of fire, and the rise of hunting, have not been sufficiently studied. Engels's article "The Part Played by Labour in the Transition from Ape to Man" contains a direct methodological indication of the necessity of studying these questions.

In a word, the making of tools, the rise of hunting, and the harnessing of fire were historically the original forms of labour. They are dialectically interconnected, and represent the "core" of the process through which man and mankind arose.

"Labour begins with the making of tools."[1] The making of tools, in turn, has its genetic sources in the ability to reshape natural objects, which is found even in the hominid primates. It may be supposed that man's ancestors systematically used biologically useless objects found in nature to provide themselves with vital necessities. This gradually led to choosing from among many similar objects those which by their form would be most effective in use, and then to deliberately seeking out such objects, collecting them, building up stockpiles, and so on. As the hand was freed from use in locomotion and the "image" of a desirable natural tool formed in the brain, more and more ways of improving the "raw materials" supplied by nature became possible. At first objects close to the optimal functional form were chosen; with time the similarities grew more remote.

Tool-use, which was becoming established as a factor in biological specialisation, involved also further improving of tools before their actual use. By imperceptible degrees, the quantitative changes led to a qualitative leap—the transition to creating artificial tools, especially of stone. These could not be shaped using the

[1] Engels, *Dialectics of Nature*, p. 176.

hands, teeth, or nails, but could be used to shape all the natural materials employed at that time: wood, bone, horn, and so on.

It would be just as impossible to track down the creation of the "first" artificial tool as it would be to pinpoint the birth of the "first" man. The technological boundary between the "first" artificial tool and the "last" natural one, which was further shaped and "put right" by the hand of emergent man, cannot be traced in practice. How can a stone "usefully" shaped by wind, water, changes in temperature, and rockslides be distinguished from the first intentionally fashioned pebble tools, especially considering that hundreds of thousands, or perhaps millions of years have passed? The presence of sharp-edges (which are not likely to be made by the action of natural forces) and the recurrence of forms are only uncertain criteria.

The advantages of tool-use as a form of (originally biological) specialisation ought to have been most evident in hunting. But just how exactly? Were stones first used as missiles, or for shaping large bones and sticks, or for cutting up the kill and then for dressing its hide? Raymond Dart, who first discovered the remains of the Australopithecines, noted that they had a fairly well-established technique for butchering an antelope, and that the femoral bones of this animal were used in attacking baboons.

It has been suggested that "meat gathering" or "passive hunting"—eating the flesh of animals that had died or been killed—preceded the hunting of large animals.

Occasionally views are put forth that belittle the role of labour in the emergence of man. Labour is not infrequently identified with the instinctive manipulatory activities of animals, and this leads to a denial of the progressive evolution of the hand, the organ of labour. The noted American biologist Ernst Mayr, for instance, maintained that the use of tools, and even the making of them, is widespread among animals. The hand, he

claimed, remained almost unchanged from the time when it was used mainly to grasp branches to the time when it was first used to play the piano and to repair fine watches. The making of simple stone tools was not a necessary stimulus for the development of the brain. And so on and so forth.

Such assertions are fundamentally wrong. In a certain sense, the increasing complexity of stone tools, and hence of their making, "brought on" or caused the development of the brain and of speech. After all, the making of a stone axe is not just a matter of performing certain motions with the hands. The most important part of the process is concentrating the attention on the object to be made, and then dividing it properly between the material, the tools, and the work itself. The changes that took place in the hand have already been discussed.

A quantitative analysis of the stages in which the "stone industry" took shape reveals an increase in the number of labour acts and operations. The ancient pebble tools were made with a comparatively small number of blows (from three to ten); the handaxes characteristic of what archaeologists call the Chellean period of the Stone Age reveal traces of from eight to thirty blows; those of the Acheulean, of up to a hundred. The making of the first flint knives (Mousterian) involved more than two hundred actions, which can be grouped into ten or eleven operations. These complex tool-making procedures brought about a greater demand for certain mental traits, among the most important of which was the concentration of attention on a narrow field—not only for fine work, but also for performing many similar actions. The use of tools demanded a greater ability to divide the attention between several objects, or between several people working together. Thus the improved ability to concentrate was accompanied by the rise of memory, thought, and imagination, and also by the development of will and an ever more conscious striving to formulate and realise purposes.

The creation of artificial tools certainly did not mean that adapted natural tools, and *a fortiori* the bodily organs of labour, were no longer used. It is entirely conceivable that a tool used in butchering a carcass was artificial, while another, used in hunting, was natural, having been slightly "modified" or specially chosen. In the gathering of vegetable food, meanwhile, the earliest humans may have used nothing more than unmodified natural objects, or perhaps their bare hands alone.

For a long time all three types of tools coexisted; they made up an integral system for supplying the vital needs of man in the making. But the purposeful making of tools was the leading activity, the one most dynamic in its development; it subordinated the other types to itself and helped to shape them. Tool-making offered the best chance to accumulate social experience and could quickly be adapted to meet current needs. This is the basic track that tool-use followed on the way to the production of instruments of labour.

"And what are the most ancient tools that we find—the most ancient judging by the heirlooms of prehistoric man that have been discovered, and by the mode of life of the earliest historical peoples and of the rawest of contemporary savages? They are hunting and fishing implements, the former at the same time serving as weapons. But hunting and fishing presuppose the transition from an exclusively vegetable diet to the concomitant use of meat, and this is another important step in the process of transition from ape to man."[1]

Of all the forms that the struggle for existence takes, hunting is genetically closest to the animals. In the era when man and society emerged, it was a dynamic activity, as dangerous for the hunter as for the prey. Hunting promoted the development of weapons and of tools for cutting up the kill. Moreover, by increasing the amount of meat in the diet it helped speed up the

[1] Engels, *Dialectics of Nature* p. 176.

evolution of the brain, and also the development of the nervous system, the sense organs, and the skills in orientation that are now known as quick-wittedness. The hunter places himself in a situation that is constantly shifting, in which the roles of the pursuer and the pursued may suddenly be reversed. Here we see biological selection in its most striking form. Without tusks, talons, or a shell, and having no particular fleetness of foot or facility for camouflage, man's forebears were able to hunt predators, ungulates, and mammoths. What made this possible was tools: natural, adapted, and artificial. The next elements of hunting to appear were fire and joint efforts (i.e. the pooling of physical and intellectual powers). The chase is one of the first forms of cooperative activity (after defence against predators). It is almost natural, occurring sporadically in the animal world. There have been cases, for example, of apes killing a leopard with stones. Artificial tools are not strictly necessary for the chase, but the new activity nonetheless marked a giant step forward in productivity.

It would be fundamentally wrong, however, to absolutise the importance of meat eating, making it virtually the prime factor in the humanisation of the ape, and to identify hunting with a fatal aggressiveness. Nevertheless various attempts have been made to do this. Robert Ardrey, who has been mentioned more than once above, has boldly claimed that man's very first tools were weapons. If one so desires, it is possible to believe that practically all of Palaeolithic man's tools could potentially be used for attacking and destroying his own kind; thus, in Ardrey's view, emergent man was no more and no less than the product of a biological evolution towards aggression among a particular strain of carnivorous killer-apes. Walter Hollitscher, the noted Austrian Marxist scholar, has justifiably ridiculed Ardrey's arguments: "Early man was no more a murderer than the workers in the slaughterhouses of today, who supply meat for the non-ve-

getarians."[1]

The change to a diet including meat was due to a number of factors. Evidently an ecological deficit of plant resources arose, and emerging man came to rely more and more for food on the killing of mobile animals active in all seasons, many of which were capable of defending themselves effectively. Game animals were not so closely bound as plants to the natural rhythms of climate. It is possible that at first the meat taken as food came from immobile animals, ones that had died or fallen prey to predators, and weak specimens, and also that skulls and bones were broken open so that brains and marrow could be consumed. It is with this last possibility, by the way, that many scholars are inclined to connect the remote origins of pebble tool industries. In their opinion stone was first used for breaking up the skeletons of animals that had died or been killed, and only much later for working other stones. These were shaped in accordance with the established technological tradition and given the properties needed in use.

Thus it was not genetic aggressiveness, or an inborn lust for blood, or an urge to kill living creatures that brought about the rise of hunting. Pre-humans—unable to run swiftly over open country and without fangs, talons, and the like—were faced with the necessity of defending themselves against large predators such as the cave bear and the sabre-toothed tiger, and of competing with them for suitable natural cover and game. It was these natural circumstances that led them to take up hunting, which acquired a fundamentally different character through the use and making of tools.

But hunting itself could not have developed successfully in isolation from the leading form of emerging labour: the making of tools and weapons. The tool-maker, after all, can escape starvation only if someone else supplies him with food (or if he himself lays in a supply beforehand). At the same time, it is quite unlikely that any individual could supply food enough not only for himself but also for the tool-maker unless he made skilled use of effective tools.

[1] Walter Hollitscher, *Aggression im Menschenbild*, Frankfurt a/M., Verlag Marxistische Blätter, 1972, p. 152.

The conflict between tool-making and hunting (food procuring) was no doubt one of the motive forces behind the rise and development of the primitive-communal mode of production. It is possible to imagine a situation in which excessive zeal in making and stockpiling tools made it difficult for the earliest men to satisfy their immediate biological needs. In such a case they would die out. Some camps that have been found contain thousands of finished and half-finished tools, and bear no traces of natural cataclysms or attack by predatory beasts. At the other extreme would be an obsession with procuring food at the expense of making the necessary tools. This too could lead to extinction, or to regression through the specialisation of natural organs brought about, for example, by changes in the ecology.

Thus the earliest forms of hunting bore the seeds of a dialectic between physical (executive) and intellectual (organisational) labour, between the making of tools and their actual use in securing food. The organisation of traps, drives, and chases, and especially the making of tools and weapons, demanded not only joint effort and a division of roles among the participants, but also some sort of idea or model (even if only a general and obscure one) of how the animals and the hunters would behave—a programme of action. Different situations that might arise had to be considered. Moreover, it was necessary that many individuals perform actions that were as meaningless, from the immediate biological point of view, as shaping one stone with another. In a drive, for instance, the hunter must not steal up on his prey (as predators usually do) but on the contrary make noise to scare the animals into a pen, a pitfall or a swamp, or over a precipice.

The regular eating of meat, which eventually became a necessity, and the use of tools in connection with the need to shape stone with stone both helped bring it to pass that our ancestors learned how to use fire, to tend it, and later to make it themselves. In attempting to reconstruct the beginnings of human history, we think of mechanical effects brought to bear on the object of labour through tools, and especially stone tools. Another powerful force that was used was one utterly inaccessible to the animals: fire. As a virtually inexhaustible source of non-bodily energy, it not only helped the "transitional beings" to survive in the biological struggle, but also lighted them on their way to a fundamentally new kind of progressive evolution.

Fire was the first non-organic natural force put to use by a living being and operating without his direct participation. It was a universal "tool" in the cooking of food; it helped man's ancestors to change from a vegetarian to a carnivorous diet, making meat easier to digest and reducing, through the action of heat, the amount needed to assuage hunger. Fire was a powerful weapon, one that could not be used by any animal, both in defense and in the nascent forms of game-driving. It was a source for the artificially regulated "production" of heat and light, and thus an important material condition for the emergence of labour. For example, labour could be more productive, and of greater duration, when it was performed in more comfortable surroundings. In a word, the hearth-fire prolonged life, labour, and leisure, broadened the field of vision, and increased the time in which individuals, including those of different generations, could be together. It was used to drive predators out of caves, which then became gathering places at night and during the cold seasons, a sort of localised centre for the rise of sociality.

The most important role of fire in anthroposociogenesis, however, and one that has not yet been sufficiently studied, was that of an energy tool. Unlike stone,

wood, and other material objects found in nature, the action of which was predominantly mechanical, fire changed the properties of other natural objects, and thus considerably broadened the range of their effective use. Fire showed all the basic characteristics of a tool: it was placed between the individual and an object in external nature, and used jointly as a means for purposeful action on the object of labour. At the same time, it also influenced the tool user, significantly widening the range of forms in which labour was emerging. In particular, it made possible the rise of "domestic labour", of fundamentally new kinds of hunting, the making of tools from new materials, and so on. Simultaneously the need arose to tend the fire and to understand how it could be kindled and how used for comfort and the making of tools and food. Fire increased the scope of extra-biological activities unknown to the animals. Much like the chisel, it was used as a "tool-making tool": horn could be softened in fire, pitch would melt down, and wet wood could be sharpened and hardened. Fire could even be used to break stone by subjecting it to sharp changes in temperature. It is possible to distinguish the following stages in the harnessing of fire: 1) episodic use of natural fire (whatever its origins); 2) the tending of fires ignited by natural means; 3) the kindling of fires by friction, the striking of sparks from flint, and so on.

Engels regarded the kindling of fire by friction as the first condition necessary for culture and freedom, as the boundary separating mankind from the animal kingdom, and as a source of productive forces more significant in its own day than the steam engine was to prove later. "On the threshold of human history stands the discovery that mechanical motion can be transformed into heat: the production of fire by friction ... has had an ever greater effect" than the steam-engine "on the liberation of mankind. For the generation of fire by friction gave man for the first time control over one

of the forces of nature, and thereby separated him for ever from the animal kingdom."[1] The kindling of fire by friction is in principle analogous to the making of tools with other tools prepared earlier and carefully safeguarded; it left a much greater imprint, though, on ancient traditions and customs. Engels compared this to the ritual and magical use of stone knives in the Bronze and Iron ages: "Long after other methods of producing fire had become known, every sacred fire among the majority of peoples had to be obtained by friction.... Thus, down to our own day, the grateful memory of the first great victory of mankind over nature lives on—half unconsciously—in popular superstition, in the relics of heathen-mythological recollections among the most educated peoples in the world."[2]

The use of fire is an obviously collective activity, and one that must be maintained constantly. Like a domestic animal, fire must be watched and tended without interruption, and this cannot be done without cooperative efforts. After all, fire is a source not only of energy but also of grave danger; it demands caution and provision for fuel. Together with achievements in tool-use and the elaboration of speech as a "tool" for reflection and communication, fire became a factor in the rise of social production. It radically changed the place that man's forebears occupied in the ecological balance and opened broad new regions to settlement. The use of fire had a number of highly significant demographic consequences: it prolonged life, reduced the number of deaths occurring in childbirth, from attacks by predators, and from disease, wounds, etc., and promoted the building of permanent dwellings, the division of labour, and human migrations.

Certain bourgeois authors, grandiloquently calling fire a "magical tool stolen from nature", are inclined to

[1] Engels, *Anti-Dühring*, p. 141.
[2] Engels, *Dialectics of Nature*, p. 111.

connect its first use with an effort of "pure" intellect. Edmund White, for example, suggests that "the first men were first to meet the challenge of winter with their wits. They discovered how to use fire to their advantage".[1]

It is characteristic that this American author has nothing to say about the use of tools, the rise of the collective, or the genesis of labour. But it is precisely through the systematic use of inorganic objects found in nature as a means of meeting immediate biological needs that the instinctive animal fear of fire could be overcome. And then a fiery brand, picked up in hands freed from use in locomotion, was transformed into a tool for frightening away predators. It was the type of vision developed by man's forebears, who had learned to walk upright, that made it possible for them to discover naturally occurring fires (volcanoes, grass and forest fires, or the escape of burning gases from under the earth). Only beings having free use of their forelimbs and living in groups could learn to use, and later produce, a social tool such as fire. A single individual would derive little benefit from fire, and it is unlikely that he could keep it going for long.

Fire promoted the development of consciousness in beings possessing a dynamic psyche and faced with the necessity of actively transforming their environment. It deeply changed their way of life, making it more collective, and thus promoted the rise of speech and hence of sociality.

Labour and Speech

Engels's views on the origins of labour have been examined in the foregoing section. He noted the external

[1] Edmund White, *The First Men*, New York, Time-Life International, 1975, p. 20.

similarities between labour and the vital activities of the animals and pointed out that labour is significantly different from the animals' direct metabolic interchange with nature. Labour leads to man's changing nature with the help of material (first of all stone) and energy (fire) tools. But Engels did not confine himself to analysing this most obvious characteristic of labour. He also considered the origin of another side of labour, one that is social in the proper sense of the word: the interaction of man in the making with others of his kind in the process of intentionally transforming nature with the aid of tools.

Of all the aspects of anthroposociogenesis, the origin of sociality is perhaps the one about which modern science has learned least. Nevertheless it is quite clear that labour was the foundation of social existence and material culture. Even the very first forms of labour, such as making artificial tools, game-driving, and procuring fire, would have been impossible without joint efforts, without cooperation. Even then, the technological side of labour, which is "directed towards" nature, would have been inconceivable without the social side. The possession of tools is not sufficient for the emergence and existence of man. He "needs" other people (and this is a necessary condition for labour), just as they in turn "need" him. Modern science connects the rise of a hypothetical primary collective as the subject of labour with the appearance of primeval groups of "transitional beings", which developed naturally towards communities based on blood ties.

Engels repeatedly pointed out the importance of this phenomenon for the rise of man. In "The Part Played by Labour in the Transition from Ape to Man", he argued that "it is obviously impossible to seek the derivation of man, the most social of all animals, from non-gregarious immediate ancestors".[1] In *The Origin of the*

[1] Engels, *Dialectics of Nature*, pp. 172-73.

Family, Private Property and the State he explained the role of the herd instinct found in animals and of its transformation in anthroposociogenesis: "For evolution out of the animal stage, for the accomplishment of the greatest advance known to nature, an additional element was needed: the replacement of the individual's inadequate power of defence by the united strength and joint effort of the horde."[1] Engels wrote to P. L. Lavrov: "In my opinion, the social instinct was one of the most essential levers of the evolution of man from the ape."[2]

The group instinct, as a manifestation of the original "social instinct", was undoubtedly one of the most important conditions for the development of human society. It helped objectively to compensate for the biological "weakness" of a race of highly developed anthropoids that was evolving in a new way. The primeval group came into being as a sort of environment within an environment; it assumed certain functions "mediating" between nature and the individual. This enhanced the significance of the behaviour patterns acquired during the lifetimes of these prehistoric beings, and helped to shape perceptions of the surrounding world based on reason and emotion. The actions of the individual were coming to be more and more subordinated to "common" tasks that were becoming traditionally established. An ever greater number of the acts instinctively performed by members of the "primeval group" were directed towards a "common" result that might depart from the biological needs of the individual or even run contrary to them.

The interaction of emergent man with others of his kind might have been mediated by the exchange of activity and its products (gathering, hunting, tools, food,

[1] Karl Marx and Frederick Engels, *Selected Works* in three volumes, Vol. 3, Moscow, Progress Publishers, 1976, p. 214.
[2] Karl Marx and Frederick Engels, *Selected Correspondence*, Moscow, Progress Publishers, 1982, p. 285.

and the like). But ultimately it could not dispense with direct, immediate contacts, the coordination of activities, and the exchange of experience, without efforts to organise and to foresee approaching events. The use of the stone axe, as a sort of main tool, and of fire were accompanied by a qualitatively new phenomenon: articulate speech. Its social function was to bring about the conditions necessary for deliberately changing nature in the sphere of emerging material production.

Thus speech and thought, which was born with it, reflected specific objects: processes in inanimate nature and the activities of the language-users themselves. At first the two were less distinct in practice than in principle. "Mastery over nature began with the development of the hand, with labour, and widened man's horizon at every new advance," Engels wrote. "He was continually discovering new, hitherto unknown properties in natural objects. On the other hand, the development of labour necessarily helped to bring the members of society closer together by increasing cases of mutual support and joint activity, and by making clear the advantage of this joint activity to each individual."[1]

The development of the primeval group was conditioned to a large extent by the growing need to ensure its internal unity and stability. The language of gestures, which grew out of the demonstrative behaviour of the higher primates, and the language of interjection-like cries were limited in principle by the means and tasks of providing for immediate biological survival. By this very fact they were incapable of reflecting the variety that was being discovered in the surrounding world, and also the dynamics of increasingly complex situations that required coordinated action by individuals. "In short," Engels wrote, "men in the making arrived at the point where *they had something to say* to each other. Necessity created the organ; the undeveloped larynx of

[1] Engels, *Dialectics of Nature*, p. 173.

the ape was slowly but surely transformed by modulation to produce constantly more developed modulation, and the organs of the mouth gradually learned to pronounce one articulate sound after another."[1]

Boris Porshnev, a prominent Soviet philosopher and historian who has studied the relict hominids, believes that the wide range eventually developed by the human vocal apparatus is due in part to the imitation of warning signals used by large animals against which there was no adequate material means of defence. With the domestication of animals and the development of material means of labour this "psychological weapon" lost its former significance, but it played an important role in the evolution of the human voice and the rise of speech.[2]

Another distinguished Soviet scholar, Aleksey Leontyev, believes that Neanderthal man already had "the necessary vocal apparatus, but its functions were limited: the edges of the vocal ... chords, had not yet curved round and the passage between the larynx and the oral cavity was narrow, while the soft palate was further away from the back of the larynx than in present-day man. This means that the speech of the Neanderthal man must have been accompanied by a lot of inharmonious, piercing, high-pitched noises: whines, screeching, squeals, etc."[3]

Several years ago an American scholar, Philip Lieberman of Connecticut University, attempted to reconstruct the pharynx of Neanderthal man on the basis of fossil remains. Work on this model led investigators to two interconnected conclusions. The "speech" of the Neanderthal was poorer than that of modern man from the articulatory standpoint, and was ten times slow-

[1] Ibid.
[2] Boris Porshnev, *O nachale chelovecheskoy istorii* (On the Beginnings of Human History), Moscow, 1974.
[3] A. A. Leontyev, "Early Man Goes Through the Speech Barrier", *The UNESCO Courier*, November 1976, p. 22.

er. Furthermore, in a comparison of the vocal apparatus of an adult human, a child, and a newborn infant with the Neanderthal model and with the pharynx and larynx of a hominid ape, it was found that a child just beginning to speak, and even more so a newborn infant, is closer to man's ancestors than to his own adult contemporaries (his parents).

All this is in accordance with the methodological views expressed by Engels in "The Part Played by Labour in the Transition from Ape to Man". He wrote that "just as the development history of the human embryo in the mother's womb is only an abbreviated repetition of the history, extending over millions of years, of the bodily evolution of our animal ancestors, starting from the worm, so the mental development of the human child is only a still more abbreviated repetition of the intellectual development of these same ancestors, at least of the later ones".[1]

The subjective side of labour in the process of formation was reflected in the "automatism" of certain natural processes that was empirically discovered, and then consciously used, by human beings, and also in the purposefulness of labour. This served objectively to complicate the chain of conscious labour acts and operations, and correspondingly to improve man's intellectual and emotional faculties. Communication through signs and gestures became established as a function of "emergent consciousness". The emergence of speech made it possible to influence the consciousness of other people.

The dialectics that Engels discovered in the rise of labour and the formation of speech reflects the objective conflict between a qualitatively new relationship to nature and the inertia of an earlier type of ties among individuals. This created a need for effective coordination of the actions of different individuals in a group, and of the groups themselves. Speech, in turn, is addressed to the other when it serves as an external means of conveying and receiving information, and to the self when it serves to retain and process information. Reflection begins to appear, and plays a significant role in the further elaboration of thought. Man not only knows; he knows what he knows. Human consciousness reflects not only the external situation, but also the individual's place in it, his relation to it. Consciousness and a social phenomenon would be impossible without consciousness of the self, the ability to imagine possible changes in a state of affairs, and the projection of the future results of labour and of activity in general.

It may be noted that bourgeois science often sets up a metaphysical opposition between labour and speech, and then goes on to blow the significance of the gap out of all proportion. Thus for example the American biologist Ernst Mayr insists that it was speech, and not labour, that was "the key invention which triggered the step from hominid to man".[1] The Canadian sociologist Marshall McLuhan, widely known for his book *The Gutenberg Galaxy*, ignores the dependence of language and speech on labour and proclaims that communication media and systems are the decisive determinant of social relations. In absolutising this side of social activity, McLuhan sets up an opposition between the media of communications and the means of production. In such an interpretation, the "magic" of communication between people obscures the decisive role of material production, which as a social phenomenon includes as one of its components coordinated human action, the use of social experience, and so on.

Engels presented arguments proving that it is labour which creates the objective need for communication through speech as its social prerequisite. Furthermore, it was early man's collective labour that led to collectivism in other areas of life: consumption, communica-

[1] Engels, *Dialectics of Nature*, p. 179.

[1] Ernst Mayr, *Populations, Species, and Evolution*, London, Cambridge, 1970, p. 385.

tion, and so on. Communication implies more than the transfer of information by speech or writing. In broader sense it takes in the multiply mediated exchange of activity and of the results of material production, which use means that go far beyond speech and writing.

It is also important to remember that language was born by selecting signals from man's growing vocal range and endowing them with meaning with the help of objects and gestures. Psychological mechanisms involving suggestion and interdiction played a significant role in this process, but the key element was labour. Engels makes a special point of the determining role that the rise of labour played in the formation of language, but fundamentally different approaches to this problem are still attempted in bourgeois science. The Sapir-Whorf hypothesis, for example, assumes the priority of the linguistic side of language over the notional and logical side. This obscures the fact that language is a tool for labour and social activity. It serves as a universal form of social communication, and is not simply "superimposed" on reality like a sort of conceptual matrix. Language is in constant interaction with life, developing as a consequence of the development of the material world. The informational and logical content of language ties the objective world with man, the subject transforming the world. The lexical and syntactic side of language, by contrast, is "addressed" to man as the subject of social communication; it presupposes and conditions people's understanding of one another. It is only in the dialectical unity of these two factors that the origin of language and of speech appears as an objective dimension of anthroposociogenesis.

Modern scholarship can still benefit from referring to the creative heritage of the classics of Marxism, who show convincingly that labour, as the foundation of practice, not only created man as a social being but is constantly "reconstituting" him as such.

Social and Ecological Factors in Material Production

Even though "The Part Played by Labour in the Transition from Ape to Man" was never completed, its contents go far beyond the question of anthroposociogenesis. One important methodological aspect of Engels's article is the concept of a close dynamic interconnection between nature and society. These two relatively autonomous material systems, each of which develops according to its own laws, are nonetheless objectively linked and causally interrelated. Three basic elements of this connection are set forth in Engels's article: the genetic (nature as the cradle of humanity), the functional (nature as the medium in which society functions and an objective prerequisite for material production), and the structural (the mediated action of nature on the development of production and the influence that the latter exerts in turn on ecological processes).

Animals alter their environment only by virtue of their presence; if they change it irreversibly the result is often their own extinction. Man's relation to nature is fundamentally different, although at the dawn of history his attitude toward natural resources was that of a consumer, a predator, and to some extent like that of an animal. Over the millennia, ecological resources and restorative mechanisms have exceeded the massive scale of man's interference in the life of nature. Engels analysed a number of local ecological crises caused by man, and showed that since ancient times man's mastery over nature has presupposed knowledge of the objective laws that govern it and of how social activity, first and foremost production, must be managed accordingly.

Engels called attention to the basic difference between human labour and the relation that animals have to nature. "In short," he wrote, "the animal merely *uses* its environment, and brings about changes in it simply by its presence; man by his changes makes it serve his

ends, *masters* it."[1] But this mastery is hardly total, nor is man's power over natural forces limitless. As the spontaneous development of production increases in scale, the influence that the natural environment in turn exerts on it grows stronger; there is a sort of "resistance" to disturbances in the ecological balance.

"At every step," Engels wrote, "we are reminded that we by no means rule over nature like a conqueror over a foreign people, like someone standing outside nature—but that we, with flesh, blood and brain, belong to nature, and exist in its midst and that all our mastery of it consists in the fact that we have the advantage over all other creatures of being able to learn its laws and apply them correctly."[2]

Learning the laws of nature, and especially applying them with skill, is once again bound up with the long history of labour's development and of the social conditions in which it was performed. The use of tools, followed by the harnessing of fire and the elaboration of speech and writing, opened virtually every ecological niche on the planet to mankind. "Just as man learned to consume everything edible, he also learned to live in any climate. He spread over the whole of the habitable world, being the only animal fully able to do so of its own accord."[3] It has now been confirmed that ecological crises caused by man himself were of considerable importance in bringing about these far-flung settlements. In the course of about five hundred years, for example, mammoths and other big game were exterminated as ever greater numbers of prehistoric hunters used better and better weapons and techniques for the slaughter. Nonetheless, most modern authors assign the main role to man's increasingly active attitude towards nature. Man's settlement in all parts of the planet brought with

[1] Engels, *Dialectics of Nature*, p. 179.
[2] Ibid., p. 180.
[3] Ibid., p. 177.

it "new spheres of labour, new forms of activity, which further and further separated man from the animal". At the same time, "the further removed men are from animals ... the more their effect on nature assumes the character of premeditated, planned action directed towards definite preconceived ends".[1]

The changes that took place in the relation between man and nature as material production developed brought historical changes in human interrelations and in social organisation. And new technological and social relations, in turn, strengthened and helped to further develop the progressive forms of material production. There is thus a constant interaction of the natural and social systems in the process of material production. The results of the relation between man and nature can also be seen from the same point of view.

The element that links all social factors in material production (the making of tools and cooperation in labour) is purposeful activity. It is oriented towards two different types of process: coordinating the activity of people, and controlling natural forces. Taken together, these processes make it possible to foresee the ecological and social consenqueces of material production, both those that will appear in the near future and those more remote ones that are usually not taken into account or controlled. There was a steady growth in the conflict between social goals and the natural consequences of human productive activity.

The historical dynamism of the relation between social and natural factors in material production, and of the growing volume and complexity of the feedback flowing from nature to society, make it justifiable to distinguish different, historically conditioned ways of making use of nature. These are objectively determined both by the level of development that productive forces have reached and by the character of production

[1] Ibid., pp. 177, 178.

relations (and of social relations as a whole).

In "The Part Played by Labour in the Transition from Ape to Man", Engels analysed the logic by which purposeful activity developed as the specifically social side of labour. The "predatory" or "piratical" (appropriating) economy of the first humans differed from the animals' direct action on nature in the use of artificial tools and the presence of a social programme of inheritance (the transfer of experience, education, and training). The latter was clearly predominant over genetic selection, which lost more and more of its strength. But the *parasitical* attitude towards nature as something to be consumed held on considerably longer.

The primeval group and primitive communities were "keyed" to local ecological niches. When these were exhausted or destroyed new settlements were made in analogous or similar zones. If such were lacking, or were already occupied, a dilemma arose: extinction or a new productive specialisation. Such situations were especially frequent when gathering and primeval hunting predominated.

As the population grew and the original, narrow range of natural requirements for production was exhausted there came to be a shortage of natural resources, and especially of organic objects that were consumed directly. As a result, a new level of purposeful activity was eventually reached. Man began to manage the natural processes applied in his economy. The specialised gathering of wild grain on plots of ground specially chosen and guarded opened the way to agriculture. Taming of the young of animals killed in the hunt gave rise to cattle-breeding. The singling out and intensification of certain types of natural processes brought about specialised tool-making and the appearance of trades. The development of the social division of labour promoted specialised activity in providing raw materials and in the field of barter and trade.

Through the artificial generation in nature of processes vitally important to society (irrigation, agriculture, nomadic cattle-breeding, specialised trades), the consumers' economy eventually gave way to a producers' economy. In modern science this turning point in the development of productive forces is called the Neolithic revolution (from the archaeological term Neolithic, meaning New Stone Age).

Meanwhile, as a result of the development of productive activity, the transformation of nature moved in different directions; it became closely connected with social factors. Goals began to be determined and tasks set by a priestly élite that had risen above primitive society, and acted socially as an information centre in economic life. With the development of commodity production, the market emerged as its spontaneous regulator. The division of social labour marked a considerable step forward in mankind's productive forces. As the primitive communities broke down, private property relations and state power sprang up.

In the work under consideration Engels points out the material conditions underlying the rise of private property and notes the main logical stages in this process. He takes into account the interrelation of productive, ecological, and demographic factors. In the primitive community, land ownership was based on participation in labour by all members of the clan to the extent of their ability, and on the existence of practically inexhaustible ecological resources. As Engels pointed out, "common ownership of land corresponded, on the one hand, to a level of development of human beings in which their horizon was restricted in general to what lay immediately available, and presupposed, on the other hand, a certain superfluity of land that would allow some latitude for correcting the possible bad results of this primeval type of economy".[1] As a result of the dialectically twofold role of labour, which brings changes

[1] Ibid., p. 182.

both in nature and in society, man's production activity came to involve more and more "adjustments" of the conditions under which the natural processes he used took place. This brought about a special relation among people that was concerned with changing the environment.

The rise of private property was of decisive importance for the further use of nature. Engels regards the origin of private land ownership not as someone's evil "plot" (Rousseau), or as the "theft" (Proudhon) or "appropriation" (Dühring) of certain natural requirements for production, but as an objectively necessary condition for its further development. In this context the thesis that property plays a *regulatory* role in the life of society, which was later developed by Engels in *The Origin of the Family, Private Property and the State*, is of great methodological importance. Property, as a relation among people, was a result of their relation to nature within the framework of material production. Dialectical-materialist theory has shown the groundlessness of idealistic (and in particular theological) conceptions of the origin of private property, and also of the idea that it was carried over from the animal world, which can be found even in contemporary bourgeois literature. A radical change in social relations became the basis for the development of production. Accompanying this was an improvement in the way natural resources were used.

Engels demonstrated convincingly in "The Part Played by Labour in the Transition from Ape to Man" that the structure of social labour and the forms of its organisation depend not only on the degree of mastery over nature that man has achieved but also on the type of production relations. In the course of anthroposociogenesis and the historical periods that followed, man attained a measure of independence from nature. At the same time, each human being and all classes came to depend more and more on the spontaneous forces of social development. This radically changed both the character of labour itself and the way it acted on external nature. The development of production, in Engels's words, objectively led "to the division of the population into different classes and thereby to the antagonism of ruling and oppressed classes. Thus the interests of the ruling class became the driving factor of production, since production was no longer restricted to providing the barest means of subsistence for the oppressed people".[1]

The appearance of man on Earth brought genetic reserves into play. Man's constructive, transforming activity came to involve more and more natural phenomena, processes, and forces. His production and consumption stand in ever greater need of being harmonised with the laws of nature. In principle man is neither a humble slave waiting for favours from nature nor an imperious ruler that refuses to wait for favours, but rather desires to seize them. He is a partner and ally to nature, if only because he is a part of it and will remain so. It is an illusion to think that society is approaching complete independence from nature. In the future, it is claimed, production will involve no smokestacks or drainage pipes; it will be a closed process, with no waste products. But the sphere of interaction between society and nature is far from being limited to production!

To some extent the conception of a "consumer society", widespread in the West, reproduces in the conditions of the scientific and technological revolution the logic of the "piratical economy". Methodologically, it is based on a metaphysical separation of the relation of people to things from their relation to one another, and of this second relation from labour as the social process through which nature is transformed. Consumption is regarded as the determining component of social systems, and thus the fundamental role of labour as the

[1] Ibid.

source and means of forming and satisfying human needs is ignored.

The consequences of capitalism's ecological crisis are already showing their sinister essence. A traffic policeman in London takes in a daily dose of engine exhaust that is equal in effect to smoking a hundred cigarettes. As a recently coined gloomy aphorism has it: "Either people will do something to cut down on the smoke, or the smoke will do something to cut down on the people." But how is an ecological catastrophe to be avoided? By education? By exhortations?

One Swiss scientist claims that socially neutral technology is to blame for everything. A number of bourgeois scientists are all too eager to hide behind facts and slogans, panic and hopes, the fact that the ecological antagonism between society and nature is an objective consequence of social antagonisms, that people's relation to nature is determined by their relation to one another.

In "The Part Played by Labour in the Transition from Ape to Man", Engels shows the materialist connection between the social conditions of production and the way it affects nature on the one hand, and the ideology on the other. This has great methodological importance. The "ecological boom" in contemporary Western sociology has brought with it conceptions that ignore and distort the man's attitude to nature in the process of production and in connection with it. In particular, it has long been a fashionable doctrine in the West that mankind cannot avoid an ecological cataclysm, which will be brought on by critical depletion of natural resources and intolerable pollution of the environment. This conception obviously denies the dependence of man's relation to nature on social conditions. Capitalism's destruction of nature in the pursuit of profits and super-profits is regarded as something universal and preordained, the only possible state of affairs. The remedies suggested by many Western scholars and businessmen come to nothing more than slowing the pace of economic growth and "curbing the consumer instincts" of working people. Meanwhile they underestimate the possibilities for taking constructive steps to protect the environment on a global scale (by creating "waste-free" technologies, substituting artificial materials for natural ones, and so on).

It may well be asked what "zero growth" in production, so ardently championed by bourgeois ideologues, would mean to the hundreds of millions of destitute people in the developing countries. At best, voluntary acceptance of perpetual backwardness and dependence on imperialism and the transnational corporations. In practice this would lead (given the rate at which the population is growing and will continue to grow in the foreseeable future) to worse hunger, more widespread illiteracy and disease, and still greater backwardness. And the protein deficiency due mainly to an acute lack of meat in the diet (Engels wrote about the effect of this on the development of the brain) would clearly limit the intellectual growth of the masses of children in former colonies and dependent countries, who have known only hunger since birth.

Moreover, social regulation of the labour process that would make optimal account of the remote social and ecological consequences of productive activity cannot be achieved in the sphere of knowledge alone. Engels wrote that it would require "a complete revolution in our hitherto existing mode of production, and simultaneously a revolution in our whole contemporary [capitalist—*Author*] social order".[1]

The global scale of modern production and its effects on the Earth's natural resources, which equal geochemical processes in their power, create an objective social need for effective international cooperation for the protection and restoration of the environment. The bar-

[1] Ibid., p. 182.

riers that stand in the way of this are mainly social, rather than natural. The classics of Marxism have vividly demonstrated that the relation between people and nature in the process of production is shaped by class relations, the type of ownership of the means of production, and the nature of state power.

In this sense the newly independent countries, in choosing a social orientation, are simultaneously choosing a new way of using nature, a socially determined attitude to the nation's natural resources. The capitalist world has clearly demonstrated that it is not only anti-human but anti-nature. The industrially developed countries of the West disregarding the interests of other nations, are using their technological advantage in openly cannibalising the natural resources of our planet, which not long ago seemed inexhaustible. The USA and the Federal Republic of Germany are already consuming twice as much oxygen as is produced by their natural biogeochemical complexes. What is more, the capitalist monopolies are "dumping" those branches of industry that cause the worst pollution on the territory of newly independent countries. Even greater dangers result from the frantic arms race that imperialism has whipped up.

The gigantic multinational corporations of the capitalist countries, methodically putting more and more "pressure" on nature to provide them with colossal profits, reap benefits even from such things as the recent energy crisis.

The countries of the socialist community have planned and undertaken significant efforts to protect and restore the environment and to improve the use of nature. The Communist Party of the Soviet Union has placed before the Soviet people the long-range task of helping nature to reveal its vital forces more fully. Agriculture should be regarded as a vast and constantly working mechanism to protect and rationally use natural riches.

In the communist society of the future, natural processes will be regulated in the interests of all people and in accordance with the objective laws that govern them. The revolution in science and technology, and the prospect of organically uniting its achievements with the advantages of developed socialism, are bringing closer the era of dialectical harmony between society and nature that was foretold by the founders of Marxism-Leninism.

Conclusion

In addition to its concrete theoretical conclusions, which still retain their significance for science, Engels's article "The Part Played by Labour in the Transition from Ape to Man" contains a philosophical, dialectical-materialist analysis of the processes by which one quality develops and changes into another: from the biological form of matter motion to the social. The methodology that Engels uses as a scientific instrument to study the rise of man and society can in principle be applied to a wider range of plenomena. In taking on an independent theoretical status for science as a whole, it becomes applicable to a practically unlimited number of questions that go far beyond the immediate problem of anthroposociogenesis.

According to Lenin's well-known thesis, which resounds with special power today, Marx left us not only a magnificent study of the sources, essence, and historical fate of capitalism, but also the *logic* of *Capital.* Recent decades have shown so vividly the theoretical soundness and methodological productiveness of the writings of Marx's great comrade-in-arms that it seems quite justifiable to speak of the *logic* of *Dialectics of Nature.*

The manuscript of "The Part Played by Labour in the Transition from Ape to Man" breaks off literally in mid-phrase. But the basic problems it poses with such

skill, and even those touched upon lightly, continued to hold Engels's attention. Eight years later, in 1884, he undertook a further fruitful study of the role of labour in human history, in which he brought out the significance of the major social divisions of labour that broke up the primitive-communal formation. Its title is *The Origin of the Family, Private Property and the State.*

In addition to the writings of Marx, Engels, and Lenin, Progress Publishers puts out pamphlets intended for the general reader who is studying Marxist-Leninist theory. These are devoted to individual works by the classics of Marxism-Leninism.

In the present pamphlet the Soviet scholar Igor Andreyev demonstrates the significance that Engels's "The Part Played by Labour in the Transition from Ape to Man" had for the formation of a truly scientific world view. Proceeding from the theses advanced by Engels, the author sets out the basic stages in the rise of man and society. The pamphlet draws on modern scientific findings in archaeology, anthropology, and ethnography that confirm Engels's basic propositions. A critique of non-Marxist views on these questions is also presented.